December 30, 1946

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STEEL

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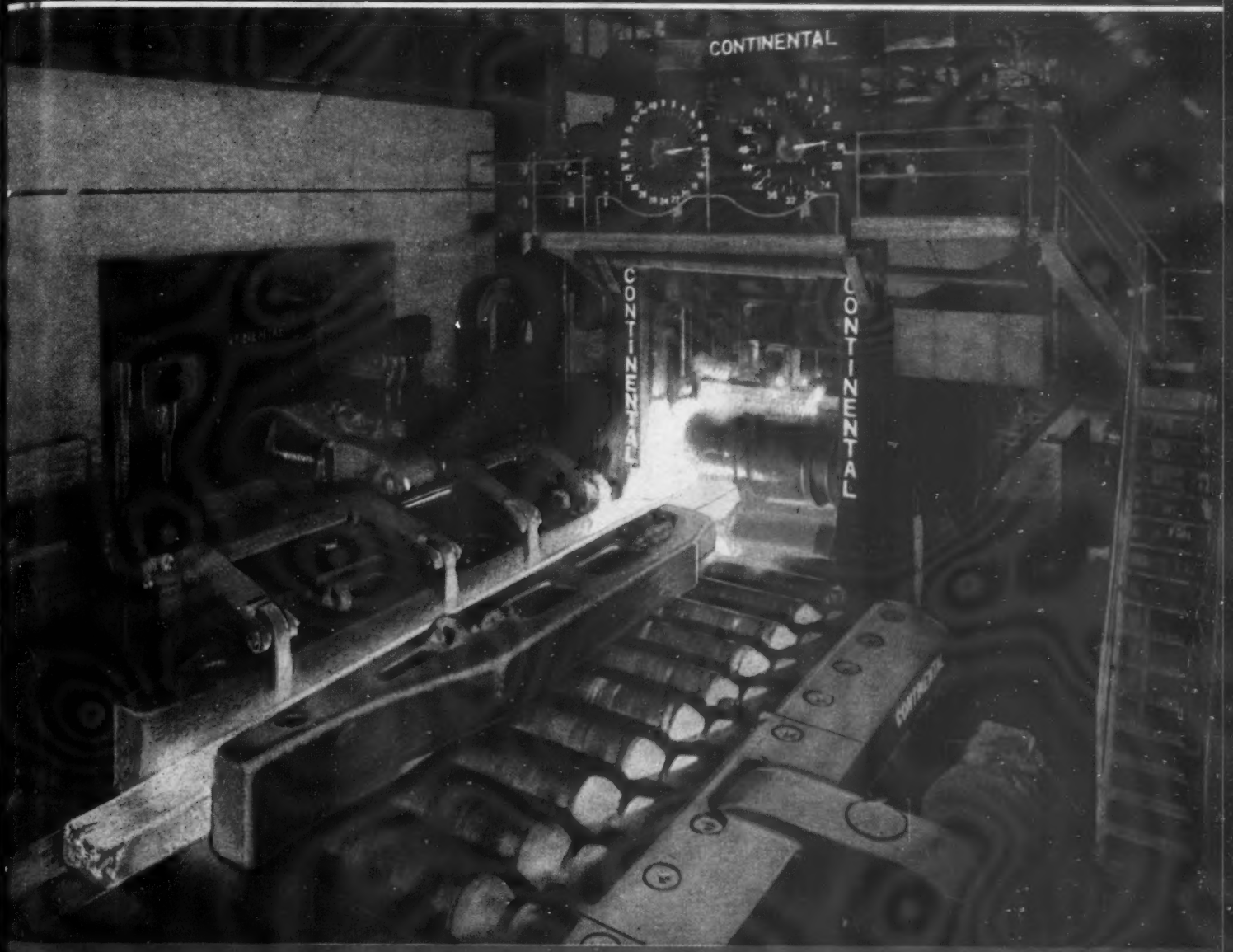
The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX PAGE 29



FOR THE *Last Word* IN
BLOOMING MILL DEVELOPMENTS
. . . BUILT BY ENGINEERS RESPONSIBLE FOR AMERICA'S FOREMOST BLOOMING MILL INSTALLATIONS

Check First with

Continental
FOUNDRY & MACHINE CO.
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INDUSTRY'S HEADQUARTERS FOR
ROLLING MILL EQUIPMENT
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ALL PUMP AND MOTOR PARTS ARE
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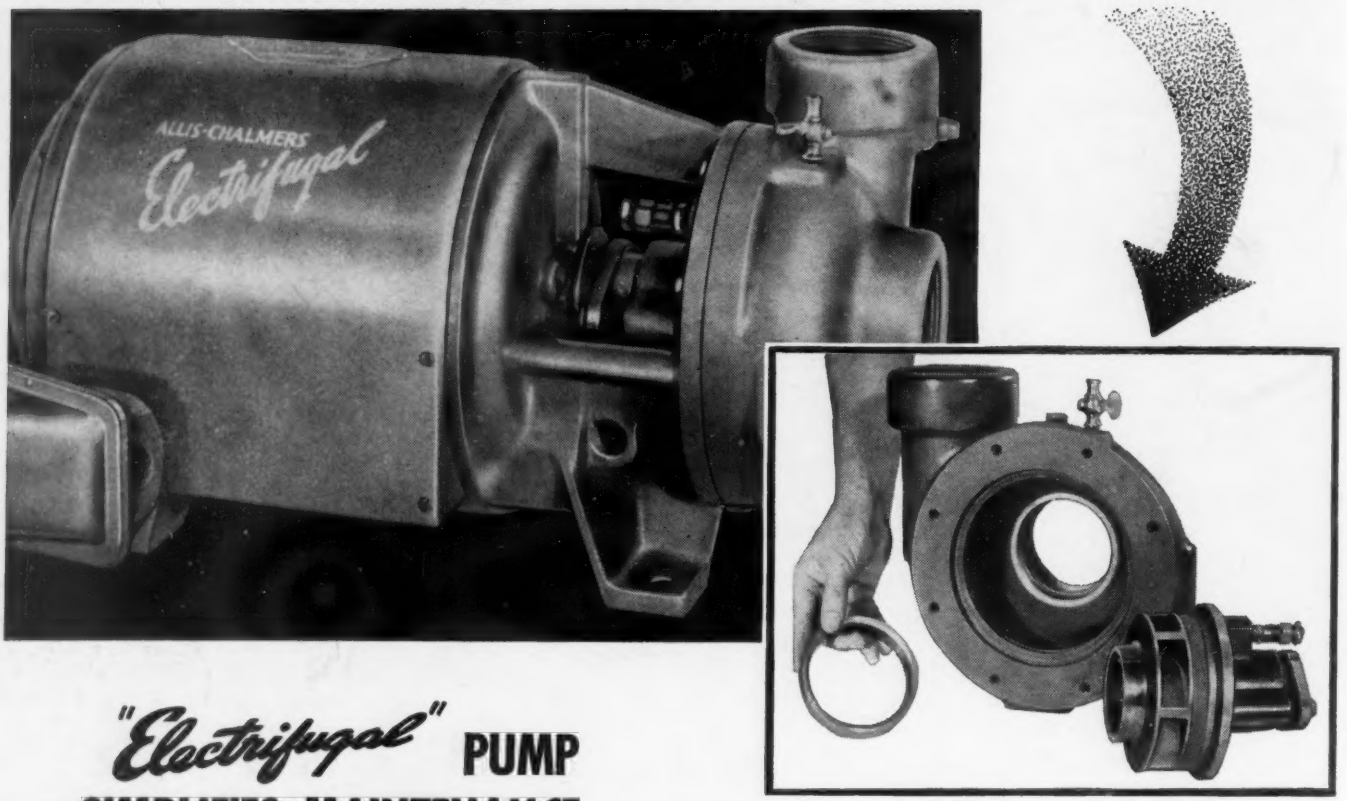

"Electrifugal" PUMP SIMPLIFIES MAINTENANCE

AS THIS photo suggests an "Electrifugal" pump is simple and sturdy in design. Moving parts are few and easy to get at. The pump can be taken apart readily, for inspection and replacement of packings or wearing rings, when necessary.

Compact, rigid design gives you an efficient, quickly installed "package" pump ideally suited to a wide range of applications . . . low in first cost and cost of operation.

COMPLETE LINE OF CENTRIFUGAL PUMPS

In addition to "Electrifugal" pumps in capacities of 15 gpm to 1600 gpm, heads to 500 feet, motor hp ratings from ¾ to 25 hp — Allis-Chalmers designs and builds a complete range of sizes and types of centrifugal pumps up to capacities of 170,000 gpm.

In Allis-Chalmers' broad line you can select from single and double suction, single and multi-stage, liquids and solids-handling types . . . offered with and without Allis-Chalmers motors. Ask for bulletin B6059.

ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A2072

Construction Features That Cut Pumping Cost:

ONE RIGID FRAME supports both pump and motor. Impeller and rotor are on the same shaft. No coupling and aiignment troubles — vibration cut to a minimum.

LO-MAINTENANCE splash-proof motor, specially built for pumping service . . . in the same plant that makes the pump. That means undivided responsibility.

BRONZE WEARING RINGS protect casing from wear. New plastic water seal and five or more generous packings are additional long-life features that cut maintenance costs.

PROVED PERFORMANCE . . . every unit thoroughly tested at the factory; efficiency, capacity and head are carefully recorded and filed for reference. A 2072

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment
★ Biggest of All in Range of Industrial Products ★

Electrifugal PUMPS

Shovel boom reduced 3050 lbs. with Mayari R

RHYMES WITH "FIERY"

Lima shovel, Type 1201, with air-control. The 42-ft. boom is built principally of Mayari R

The 42-ft. boom of this Lima shovel weighs 12,200 lbs. The channels, side plates, top and bottom of the boom are made of Mayari R high-strength steel. This construction reduced the deadweight an estimated 20 per cent, or approximately 3050 lbs. Another example of worthwhile weight savings effected by the use of Mayari R in earth-moving and heavy construction equipment.

Mayari R's tensile strength of 70,000 psi and minimum yield point of 50,000 psi permit its use in lighter shapes and gages. This means substantial deadweight reduction in the finished equipment without sacrificing strength. Or, if greater than normal strength is required, Mayari R supplies it without increasing the overall weight.

This modern low-alloy, high strength steel resists corrosion, abrasion and shock. Low-cost maintenance and long life are assured. It forms and welds similarly to carbon steel, without requiring heat-treatment. Fabricating costs are approximately the same.

Consider the savings Mayari R could bring about in your own product or equipment. The new Mayari R catalog is just off the press. Write for it today.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*

AIR TOOLS HAVE THE EXTRAS

EXTRA POWER enables operator to produce more work with less effort.

EXTRA DURABILITY provides trouble-free service.

EXTRA FLEXIBILITY of speed control permits a wide variety of operations on many types of materials.

EXTRA SAFETY improves operator morale because compressed air is the safest method for transmission of power to portable tools.

EXTRA EASY HANDLING reduces operator fatigue because Air Tools are lighter in weight.

Be sure you get these **EXTRAS** in your next portable tools. Phone or write our nearest branch office for further information or literature.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 8-944

COMPRESSORS • AIR TOOLS • ROCK DRILLS • OIL AND GAS ENGINES • CENTRIFUGAL PUMPS • TURBO BLOWERS • CONDENSERS

It keeps 33 buzz saws buzzing

A typical example of B. F. Goodrich development in rubber

THE LUMBER that wasn't cut, every time this sawmill shut down, would have built lots of houses. Thirty-three saws cut the logs into boards. All these saws are driven by one belt. But the constant strain stretched the belt, then the mill had to be shut down while the belt was cut apart, shortened and the ends fastened together again. Whenever that happened, a lot of logs didn't get sawed into boards.

Then the mill owner heard of a transmission belt called Highflex — developed by B. F. Goodrich — that is especially constructed to resist stretching and can be made endless on the job. A B. F. Goodrich belt — 48 inches wide — was installed at less than half the cost of the leather belt previously used. In exactly the same service it lasted — not 5 years like the former belt — but *eight.* And it had to be *shortened only once in its entire life* instead of 2 or 3 times a year which had been the case.

The mill owner's records showed that the leather belt had cost him $1040 per year of service; the B. F. Goodrich rubber-and-fabric belt only $300 per year.

These savings — resulting directly from the superior performance of a B. F. Goodrich belt — are typical of similar savings that can be made in all industry with almost any B. F. Goodrich product — whether it's belting or hose or any of the 35,000 rubber products that are constantly being improved by B. F. Goodrich research. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

Behind the Scenes...

Canned But Living

For many years the makers of tinplate, most of whom by coincidence are also advertisers in STEEL, have been claiming that given the proper time for research and the wherewithal, they could can most anything. We always thought that was a little too effusive, but we have refrained from saying so on the grounds that anyone, no matter how biased, has a right to his opinion. Now, however, we're convinced. Completely and absolutely. All because of a little publicity release which came to our attention the other day, announcing that up in the State of Maine, town of Pine Point, there's a canner named the F. H. Snow Canning Co. which is now canning live lobsters. This, in our estimation, would take a bit of doing. We've read with tongue in cheek about horned toads being sealed in cornerstones and being found entrapped in rock formations, apparently alive after many years' imprisonment, but this is the first instance where we've heard of live edibles being prepared for release in your own kitchen. The can man who figured that one out must have been a biologist of some note in addition to a tin plate expert.

Buried in Coconuts

Nuts to us, a thousand times over. Now it all comes out—we'll have to admit that mathematics and Shrdlu are practically total strangers, which may account for the fact that our coconut problem evoked so many scathing letters from you erudite readers. We aren't going to go so far as to say that the answer we cadged from Fairbanks-Morse is wrong, but we will certainly have to admit that those sailors went to a lot of extra nut trouble. We will agree with Bert Harvey, of Rockford Screw Products; the office gang of L. Norris Hall in Philadelphia; Cuyler Poor of Pittsburgh Bridge & Iron; Kenneth Olson of Brockton Perforating Machine Co., and a lot of others who discovered that those poor sailors didn't have to eat 81,246 coconuts. All they had to eat was 3121, and after the midnight shenanigans, there were 1020 coconuts left to divide. There are a lot of other answers, too, we find. Guess it depends largely on your taste for coconuts which one you pick out, but we feel fairly certain that the 3121 answer is the smallest under the circumstances outlined in the problem. Reid Jones of General Steel Castings Corp. says he doubts the truth of the story, and after wading through all the heavy algebra which has been weighting down our mail lately, we can hope that he is right, and certainly we hope it doesn't ever happen again! From now on, no sailors are to be shipwrecked on coconut islands, and we are considering a firm New Years' resolution not to run any more coconut problems. And as a side remark to the Norris Hall gang in Philly—read the Dec. 9 column again—you'll find both parts of the answer to the monkey problem right there, in black & white—believe it or not! We might add that if any of the Fairbanks-Morse people are listening in, we'll be glad to forward proof of the 3121 answer, as well as methods used in reaching it—but for our money, they aren't simple!

Vacuum Coming Up

Next year, which comes up day after tomorrow, will see some important editorial material published in STEEL. We have been let in on a few by the boys upstairs, but they won't tell us very much because we invariably let the cat out of the bag. We will tell you that one of the most intriguing new subjects in the world of metallurgy is melting metals in vacuum atmospheres, and as usual, our boys are in the fore on this new development, and will shortly break loose one of the first published stories on the American developments of this subject. German material has already been published, but the German work is far behind our own, from a practical standpoint, and we know you will want to keep the eyes peeled for this new series, slated to start in January. Some furnaces have already been installed in this country, and the anxious eyes are on them, including those of our own technical staff.

Happy (We Think) New Year

Well, this stuff is dated December 30, which means that when you read this, tomorrow night will be New Year's Eve. Around here we think that 1947 is slated to be the greatest year this industry has ever seen, and we are anxious for it to begin. We'll admit that all won't be smooth sailing—there are a lot of clouds on the horizon, but industry generally is optimistic, as you'll see next week when you read our Yearbook of Industry issue. We hope that the predictions we have come up with for 1947 are wrong, but wrong only on the low side. If they're right, things will be rosy for almost all of us, but if they're wrong on the low side, that's a matter for dancing in the streets for joy, and all that sort of thing.

Shrdlu

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STEEL

Vol. 117—No. 27 December 30, 1946

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Editorial Staff on Contents Page

Operator's View of MULTIPRESS EFFICIENCY

Assembling Contact Points on Mallory Vibrator Bases

Below, 4-Ton Basic Unit

● The picture above gives you a close-up of MULTIPRESS equipped with a HydrOILic indexing table and tooled for quick, easy assembly of contact points on vibrator bases. This operation at the Mallory Company, in Indianapolis, is typical of hundreds of jobs being handled by MULTIPRESS—at speeds limited only by the operator's ability to load the dies and remove the finished pieces.

In fact, on any type of operation calling for *controlled pressure*, the revolutionary, bench-size MULTIPRESS offers such obvious advantages as—

—infinitely variable working pressures you can preset to the exact needs of any task . . .
—quick, easy, stepless adjustment of ram speed and stroke length . . .
—extremely compact design that minimizes space problems . . .
—manual and automatic controls for almost any type of ram action . . .
—a wide range of *standard* toolings and accessories for countless "special" operations.

From users in almost every industry known, we get convincing—and sometimes astonishing—proof that these and other MULTIPRESS features bring lower costs, increased production, and better products. MULTIPRESS is available in 4, 6, and 8-toncapacities. Send for details, or write regarding your specific needs.

The DENISON Engineering Co., 1163 Dublin Rd., Columbus 16, Ohio

HydrOILics INDUSTRY'S RIGHT HAND

DENISON EQUIPMENT for APPLIED HydrOILics

Investment: A Warner & Swasey *Dividend:*

Securely Chucked—with the Turn of a Knob!
Work can be chucked in a matter of seconds with a Warner & Swasey Power Chuck Wrench. Heavier cuts can be taken on pieces that are held rigidly by power chucking. Grip pressures are controllable and uniform, making power chucking safe for thin-walled pieces, too.

Power Chuck Wrench 45% Production Increase!

THE CROWN CORK & SEAL COMPANY, Baltimore, Maryland, makes bottling machines. Each machine calls for 2 stainless steel center shafts $2\frac{15}{16}$" in diameter and 68½" long, with a 2-pitch Acme thread 10½" long on one end.

Formerly, the thread was cut by single point chasing; chucking the piece by hand was difficult for the operator and the machining operation itself took much time.

Then a Warner & Swasey Power Chuck Wrench was installed on the turret lathe, making it easy for the operator to chuck the job rigidly in a matter of seconds. The shaft is now held firmly enough to allow the thread to be cut with a die head at one pass. Results—a time saving on each piece of 25 minutes . . . and a happier operator!

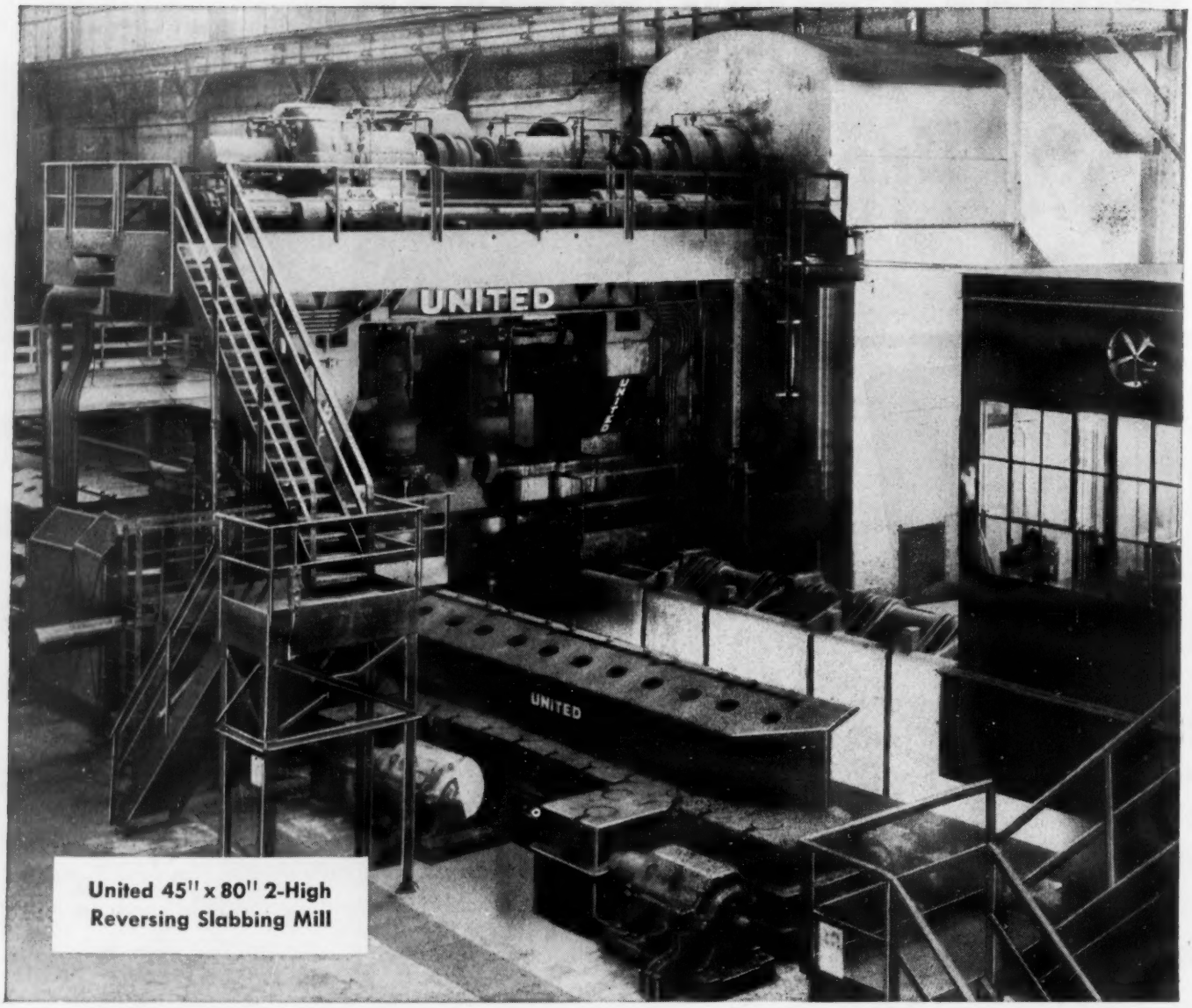
This case history is only one of many showing how Warner & Swasey Power Chuck Wrenches have increased production by saving time on chucking and machining operations, and through greater operator efficiency.

Perhaps these same results can be accomplished in your shop. Your Warner & Swasey representative will be pleased to discuss the matter with you.

You can Machine it Better, Faster, for less . . . with a Warner & Swasey

WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES



United 45" x 80" 2-High Reversing Slabbing Mill

UNITED

2-High Reversing Slabbing Mill

Because production requirements vary for practically every installation, complete standardization of slabbing mill design is impractical. Each new mill is largely custom-built for the job it is intended to do in the general process of rolling steel product. This opens the way for the development and incorporation of new features, and gives the mill designer opportunity for improvement in each new unit brought out. A recent example is the mill here illustrated.

During a lifetime of service to the rolling industry, UNITED'S engineers have contributed numerous "firsts"—many of which today are standard practice—to mill design.

Why not consult them on your next rolling application?

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at PITTSBURGH • VANDERGRIFT • NEW CASTLE • YOUNGSTOWN • CANTON
Subsidiary: Adamson United Company, Akron, Ohio
Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q., Canada

You'll want this *New Book* if you work with Stainless

WHETHER you're designing for Stainless Steel, fabricating with Stainless or using Stainless in the equipment you operate, this book—just published—will give you practical, up-to-the-minute information that will save you time and money.

In 140 pages, indexed for easy reference, it gives the latest and most complete data on every form of fabrication with Stainless Steel. Shows how to get best results in drawing, forming, spinning, welding, soldering, polishing and finishing. Tells you what you ought to know about cutting, punching and shearing, etc. Gives correct procedure for drilling, tapping, and reaming. Lists recommended machining speeds and feeds. Thoroughly discusses joint design. It will help you determine what grades and finishes of U·S·S Stainless Steel will best suit different kinds of service.

This book is FREE—yours for the asking

Send for your copy today. Just attach the coupon below to your company letterhead and a book will be sent you promptly. And if you need any other assistance, our stainless steel specialists will gladly give you the benefit of their long experience.

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Please send me your FREE book, "Fabrication —U·S·S Stainless and Heat Resisting Steels.

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UNITED STATES STEEL

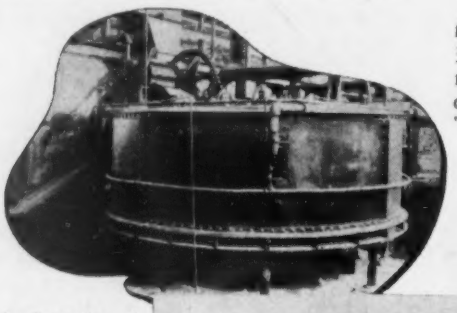
Advertisement JANUARY, 1947

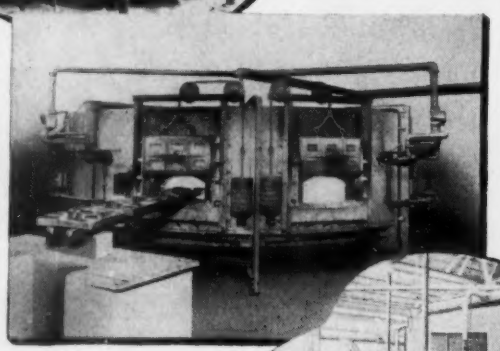
R-S FURNACE FACTS

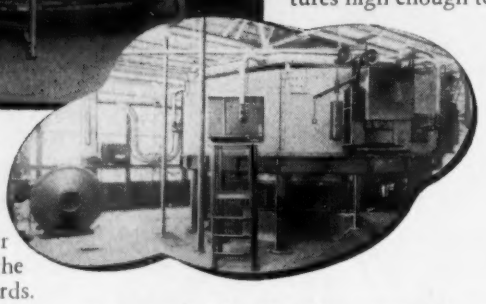
ISSUED MONTHLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

. . . AND THE BILLETS GO 'ROUND-AND-'ROUND

Few problems in furnace engineering test the designer more than *rotary-furnace hearth construction.* The weights of the hearths, their large dimensions, and the lengths of their circumferences—traveling at close clearance within stationary shells — all contribute in breeding two main types of trouble under heat: (1) jerkiness and play in the drive, and (2) jamming and friction along the hearth rim.







That is, unless the builder is an old hand at rotary furnace design!

R-S has been building rotaries for over 23 years. Consider four typical jobs, the work they do, and their service records.

At the left of the illustration is a little doughnut-type, 8'6" in diameter at the rim with a 5'6" hole. It dates back to 1923; it hardens bolts and nuts (continuously fed to and removed from the hearth) at 1650 to 1700°F; it's oil fired.

Not shown is a big one of similar design, 30' in diameter, installed in 1928 and operated at high heat without hearth expansion or warpage troubles.

The center unit is a new one; gas-fired; operating above 2000°F; and with 3 zones of control to pace the heating rate. It's used by one of our major steel companies in forging billets of a special "tender" alloy. It's 15'9" across the hearth.

At the right is another old timer; oil-fired; heating big wheel billets at 2200°F; measuring 14'9"; and chalking up an even 20-year record of trouble-free duty this winter.

More than ordinary mechanical skill is required to build such ton-heavy merry - go - rounds, which neither bind nor stutter nor crack under bruising continuous operation at chamber temperatures high enough to make steel drip. It takes more than a B.S. degree to predict strengths and clearances in large moving structures under persistent heat and load.

And that's why big rotaries are first-magnitude R-S business!

FURNACE BUYER'S NEW YEAR RESOLUTION

I shall study each furnace bid twice.
I shall stand for no skimping—nor slice
Out the features I need
For control, life and speed.
I shall see what is there—besides price!

BUY WITH AN EYE TO MAINTENANCE COSTS

According to the editors of Iron and Steel Daily News, AISE publication, over 8 cents of every steel industry dollar goes into maintenance of plant and equipment—three times the amount of that industry's earnings. Further, this "cost of maintenance" is rising: $4.56 per cast ton in 1940, versus $5.40 in 1942, versus $6.02 in 1944.

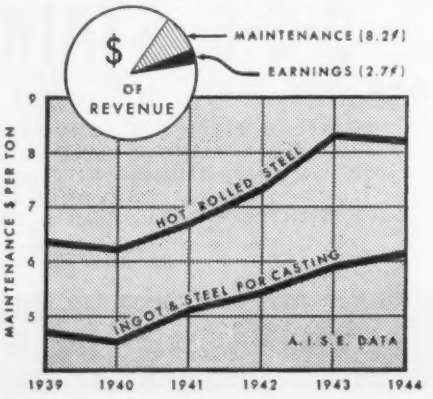
Think of this alarming trend in terms of your furnaces.

If you've bought with an eye to long life and simple operation—if you've had your furnaces designed by engineers who know the little quirks that count* and think of the men who run your plant**—you're saving real money for your company.

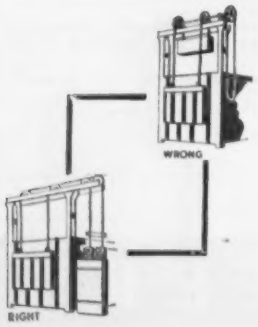
Apparently we're right at R-S in making so much of maintenance details like: expansion joint design, proper air and oil leads to burners, segmented conveyor slats, and better door counterweighting (see item at lower left).

Customers' records demonstrate that R-S designs trim down that 8.2 cents of upkeep per revenue dollar.

*See FURNACE FACTS, September, 1946.
**See FURNACE FACTS, October, 1946.



MORE ON R-S "DESIGN-CARE"



There are two ways to counterweight a heavy furnace door (see sketches). Careless engineers looking for the easiest way out often suspend counterweights right over the arch. Not so at R-S. We have too much regard for our furnaces and your maintenance costs. Lift chains or door fastenings might fail, and let the counterweights crash down onto the brickwork.

At R-S we take the pains to run all chains to the side, and to house all weights. If they drop, it's a thump—that's all!

JMLco-P-A1

X Skilled craftsmen of the Orient forged the famous Damascus swords from about the tenth to the fifteenth centuries. Tradition relates that these famous swords were laboriously hammered at the forge until the metal resembled the color of the moon, when the blade was quenched by driving it into the side of a slave. Then, as now, each group of forging craftsmen jealously guarded a standard of quality. Differences in the quality of forgings were inevitable, and the differences were due then, as they are today, to pioneering, ingenuity and enterprise—to the irrepressible urge to excel in forging craftsmanship.

X *The Vital Element in the Improvement of Metals by Forging is..MEN!*

Differences in the quality of forgings as between two or more sources of supply are inevitable. Differences in tolerances are visible and measurable, but differences of vital importance are revealed only by microscopic or X-ray examination. Differences in the mechanical properties of forgings are the result of individualized applications of engineering principles and forging techniques, applications which differ in accordance with the difference in the skill and philosophy of executives, engineers, metallurgists and forging craftsmen. Fortified by 33 years' experience in forging intricate designs, and by specialized metallurgical and engineering skill thus acquired, Steel Improvement Forging Engineers and Metallurgists: (1) know the exact forging technique that should be utilized for developing fully the qualities, inherent in a specific grade of steel, that are required to meet the stresses occurring in a specific service condition; (2) advise and assist designers regarding the correct placement of parting lines and other design elements; and (3) adhere strictly to a policy of projecting a promise of quality and delivery only when such promise can be substantiated by fact or experience, or both. Consult a Steel Improvement Forging Engineer about the measure of quality in forgings you require.

Write for reference booklet titled "The Improvement of Metals by Forging", which has been prepared especially for executive engineers, designers and metallurgists.

DROP FORGINGS

THE STEEL IMPROVEMENT & FORGE CO.

942 East 64th Street CLEVELAND, OHIO

SALES OFFICES: NEW YORK • CHICAGO • MILWAUKEE • TULSA • LOS ANGELES

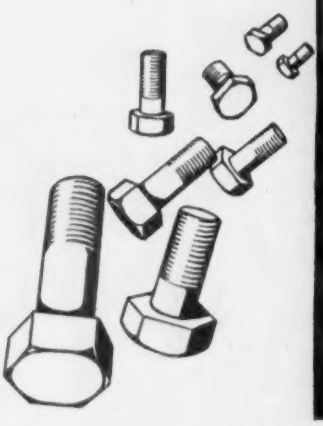
DROP, UPSET AND PRESS FORGINGS FROM A FEW OUNCES TO 500 LBS. OF ALL FORGEABLE METALS

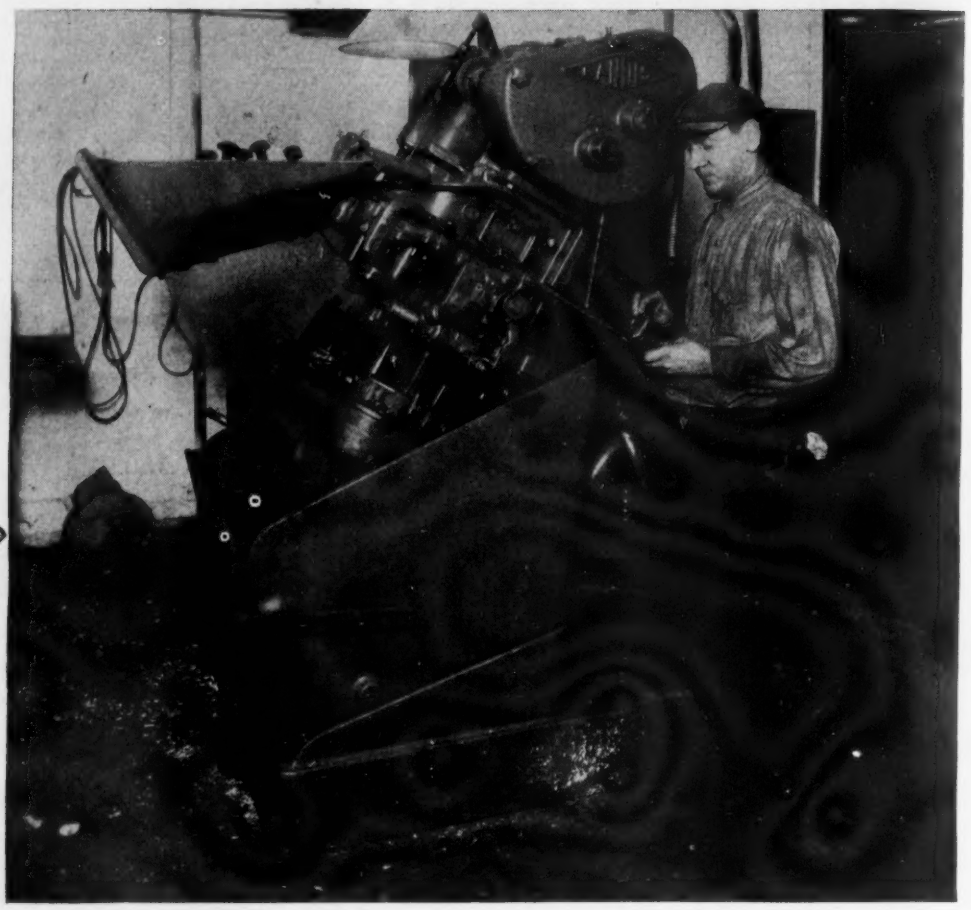
Points and Threads 680 5/8" Bolts per Hour

Productive

Accurate

Economical





And Averages 10,000 Threads per Chaser Grind

LANDIS AUTOMATIC FORMING AND THREADING MACHINE

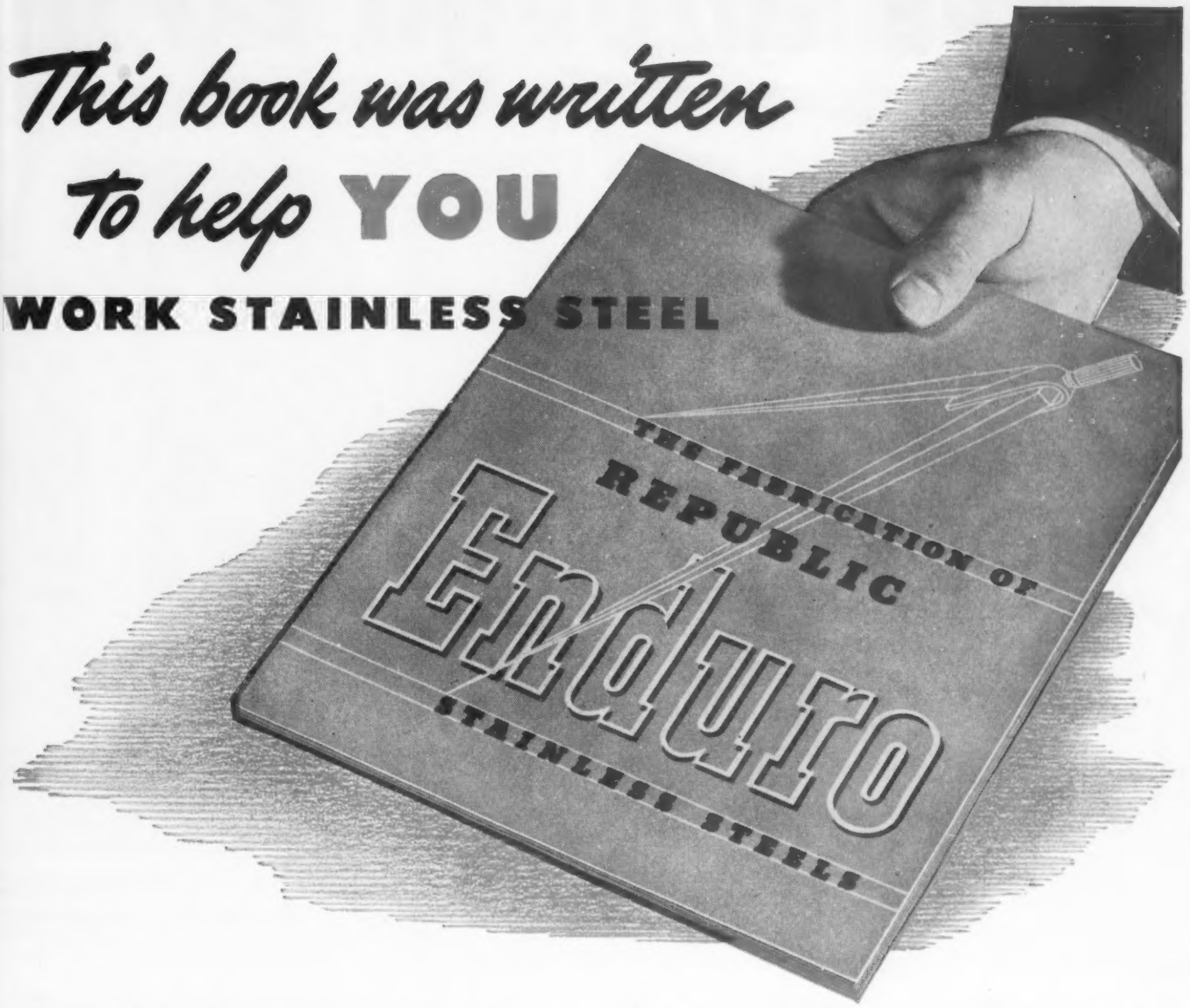
Write for Bulletin E-70

LANDIS
REG. U.S. TRADE-MARK PAT. OFF.

LANDIS MACHINE CO.
WAYNESBORO, PA., U.S.A.

This book was written to help YOU

WORK STAINLESS STEEL



SEND FOR YOUR FREE *COPY TODAY!*

It already has helped thousands of manufacturers and fabricators. It can do the same for you—by taking the mystery out of working stainless steel.

This book tells frankly what you can do with stainless steel—and *HOW TO DO IT.* At the same time it tells what you cannot do—also lists the precautions you should take when working and handling stainless steel.

Here's a book that's worth real money to you —but it will cost you only the postage needed to write us for it. So get your copy NOW. Just ask for ENDURO Booklet No. 322-C.

REPUBLIC STEEL CORPORATION
Advertising Division
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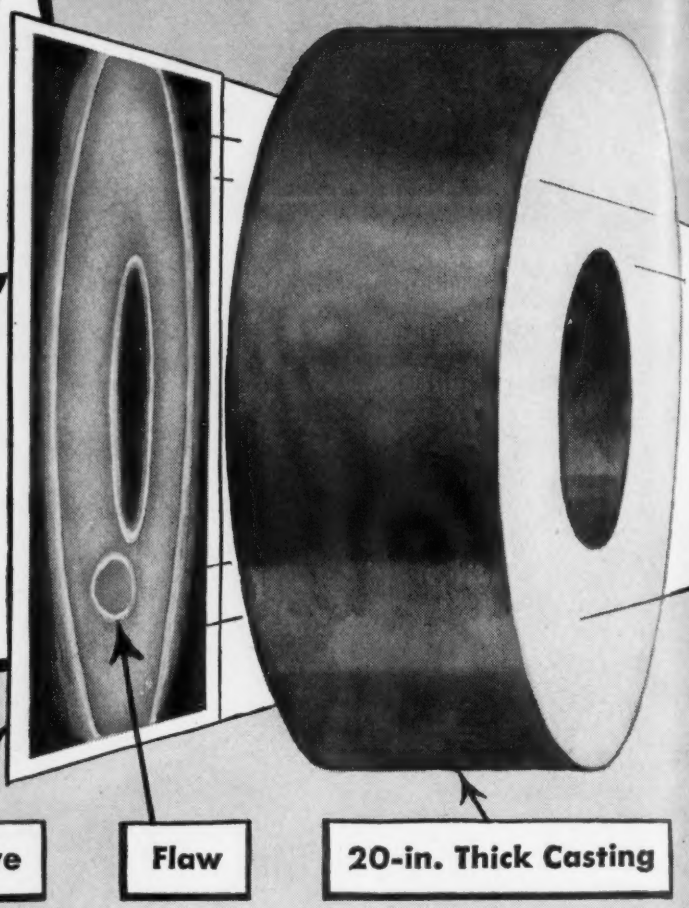
Republic
ENDURO STAINLESS STEEL
Reg. U. S. Pat. Off.

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

X-rays through 20 in.

ALLIS-CHALMERS ANNOUNCES 20,000,000 VOLT BETATRON!



Generating X-rays 10 Times More Powerful than Any Before Used in Practical Industrial Radiography, A-C's Betatron X-rays Thicker Metal Sections Accurately and at High Speed . . . Detects Flaws in Castings, Forgings, Welds, Assemblies!

PICATINNY ARSENAL, Dover, N. J. — Information has been released concerning the successful operation of the 20-million volt Allis-Chalmers betatron installed here.

Second A-C unit developed for government arsenals, it is being used for radiographic inspection of ordnance. Operation is completely automatic, with one man controlling the entire unit.

Significance of this first commercially practical X-ray instrument employing extremely high energy X-rays is that now, for the first time, larger, thicker metal sections can be X-rayed with great accuracy and high speed, penetration of metal has been extended to as deep as 20 inches.

HAS BROAD INDUSTRIAL APPLICATION

The new 20-million volt betatron enables radiographing entire assemblies — individually or on a continuous-line basis — to check parts alignment, tolerances, etc. It can reveal — in advance of costly machining — shrink, metal concentration, etc., in castings, steel parts, billets. On welds, it can detect lack of fusion, porosity and cracks.

CUTS X-RAY TIME FROM HOURS TO MINUTES

Through higher energy X-radiation, it has greatly reduced time required for exposure. For example, a cavity located anywhere in a 13-inch forging is revealed clearly and precisely in less than a 1-minute X-ray exposure. Normally with conventional lower voltage machines, hours are required to penetrate through 7 or 8 inches of heavy metal.

Characteristics of 20-million volt X-rays as contrasted with lower energy rays, offer still further advantages for both thick and thin section, individual or production-line radiography of metals.

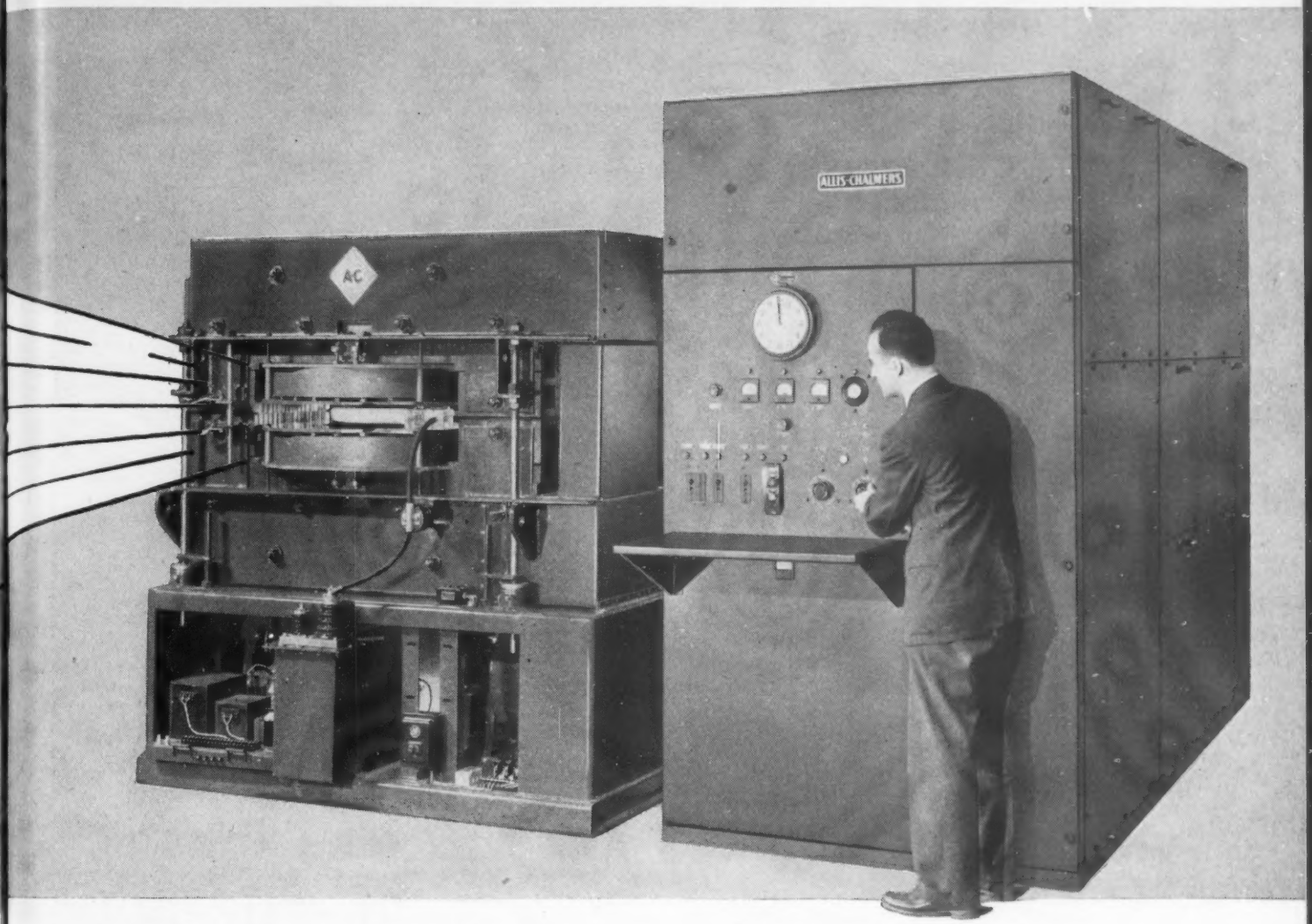
☛ ***Maximum Penetration,*** in case of thick sections, without loss of detail on steel, brass, copper, bronze, etc.

☛ ***Absolute Sensitivity.*** A flaw of $\frac{1}{32}$-inch is detectible in steel thicknesses from 2 to 12 inches. From 12 to 20 inches the minimum detectible flaw is $\frac{1}{16}$-inch.

ALLIS CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

Steel in 20 Minutes!



☛ ***Increased Latitude.*** It is now practical to radiograph, on one film, a specimen of varying thickness, without having to make several different intensity exposures.

☛ ***No Blocking*** required around outline of an irregular section. Extremely low intensity of secondary radiation enables sharpness of detail not otherwise attainable.

☛ ***Simplified Protection.*** Maximum intensity is in direction of electron stream at time it strikes the target. Result: maximum protection is required only in the forward direction of the X-ray beam.

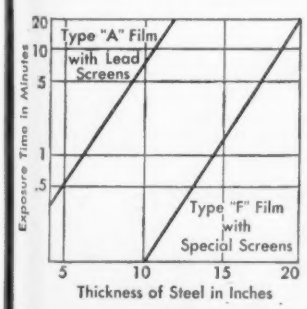


CHART SHOWS EXPOSURE TIME required for varying metal thicknesses with two most commonly used film types. Target to film distance, 4 ft.

HEART OF BETATRON is this annular vacuum chamber, popularly called the "donut."

BASIC PRINCIPLES EASILY UNDERSTOOD

Technically a betatron is an instrument which accelerates electrons to very high energies, producing X-rays of 20-million volts energy. Basically, it may be compared to a conventional transformer. Electrons are accelerated in the same manner as a voltage is induced in the secondary of a transformer. However, in place of the secondary a ring-shaped vacuum tube is employed within which electrons are caused to rotate at continuously increasing velocity until they have attained 20-million volts of energy. At this point they are caused to strike a platinum target, and give up their energy in the form of 20-million volt X-rays — *one of mankind's most promising tools in the fields of industrial radiography, medical therapy and nuclear physics research!*

SEND FOR FREE BETATRON BULLETIN!

Explains basic principles of X-rays and radiography. Develops theory and practical application of betatron. Send for this valuable addition to your technical library today!

A 2136

ALLIS-CHALMERS, Milwaukee 1, Wisconsin.

Gentlemen:
Yes, I would like to receive a copy of "Allis-Chalmers 20-million volt betatron" Bulletin 01B6684

TITLE

NAME

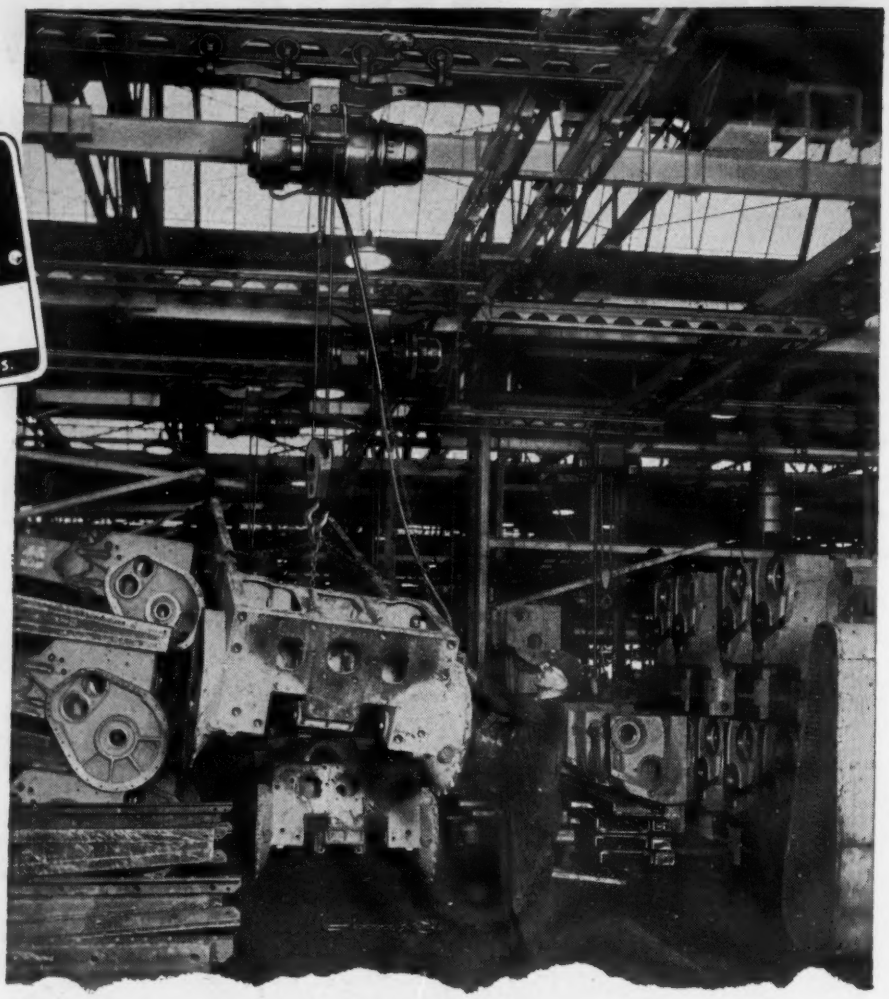
COMPANY

STREET ADDRESS

CITY STATE

20,000,000-volt Betatron

P&H HEVI-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.



YOUR BIGGEST LOADS ARE ONE MAN JOBS

—when you move them "THRU-THE-AIR!"

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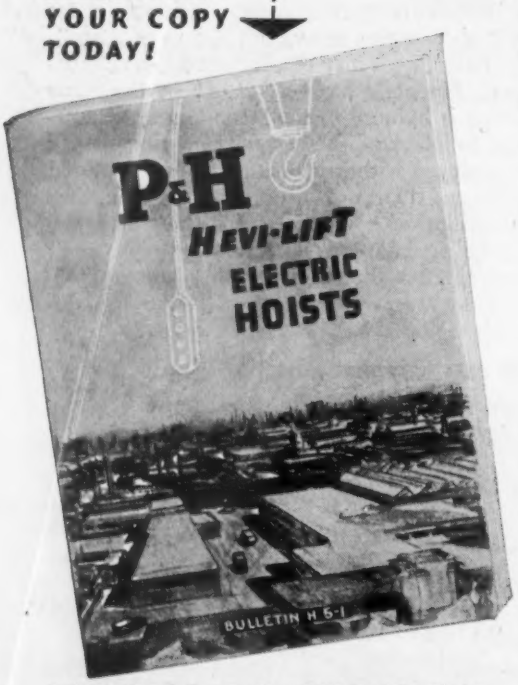


Bulletin H5-1 tells all about P&H Hevi-Lift Electric Hoists . . . where they're used . . . what kind of jobs they do. 50 pages of pictures and specifications. Get your free copy now!

Yes, *one man* does it all! Lifting . . . moving . . . "spotting" heavy loads exactly where they're wanted. And he does it all by pushing buttons!

Simple? Sure! So simple that more and more plants are finding "Thru-the-Air" handling the easiest way to cut costs — starting right NOW!

There's no waiting for results. Install a P&H Hevi-Lift Electric Hoist, and savings begin with the very first load!

Save these three ways:

(1) **SAVE TIME** . . . loads move direct, above congested aisles.

(2) **SAVE MANPOWER** . . . no wasted energies, no rehandling.

(3) **SAVE SPACE** . . . "Thru-the-Air" handling leaves floor space free.

Yes, all these savings apply to *your* plant. For details on capacities and installations, call in a P&H Hoist Engineer — no cost or obligation.

HARNISCHFEGER CORPORATION
HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

4411 W. National Avenue Milwaukee 14, Wisconsin

Performance plus

Type A Heavy Duty Industrial Safety Switch — one of a complete line of Square D safety switches available in a wide range of sizes and enclosures

with SQUARE D Safety Switches

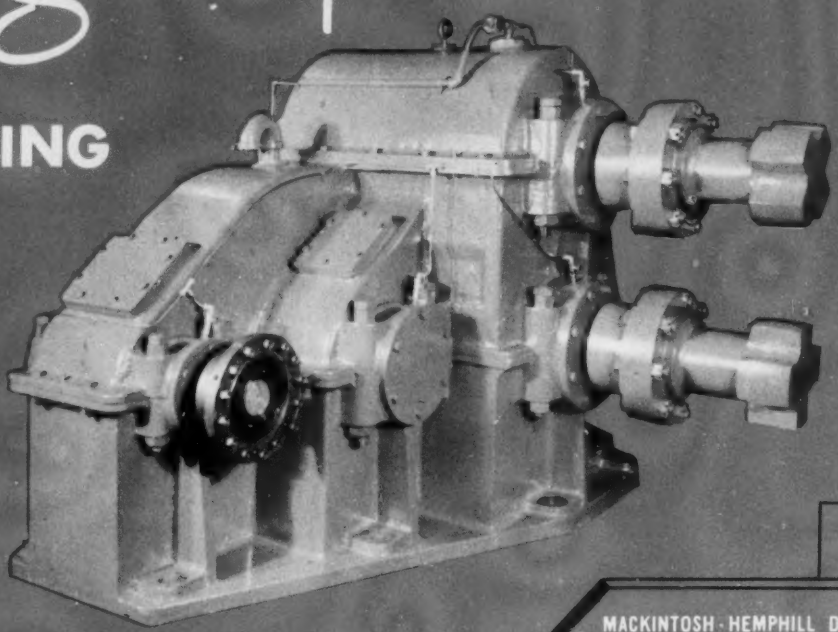
Positive pressure fuse clips effect 60% reduction in heating of fuse clip contacts. Multi-spring jaws assure uniformly distributed contact pressure. Square D quick-make and quick-break mechanism eliminates dead center. Arc suppressors (supplied on switches rated above 250 volts) increase rupturing capacity by 500% or more. And—completeness of line means the right switch for any given application.

Wherever Electricity is Distributed and Controlled

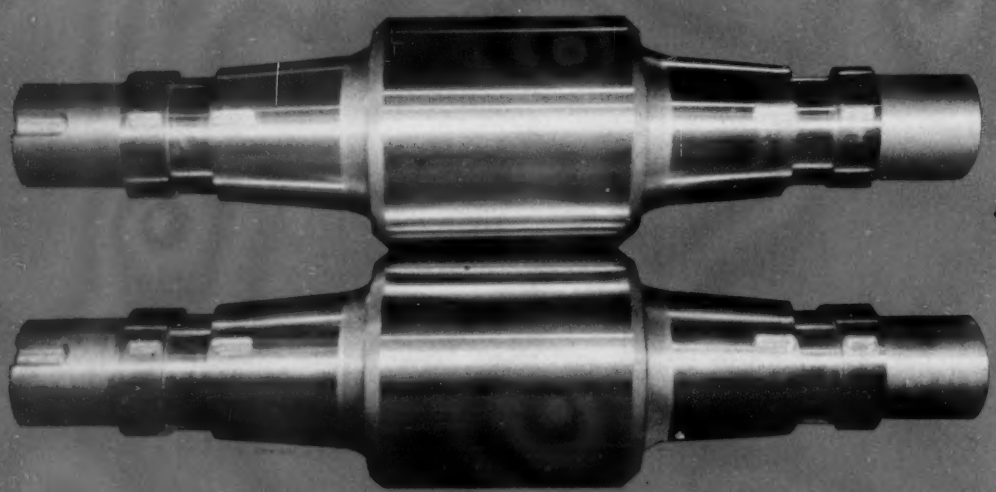
SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

8 guideposts to PRODUCTIONEERING



MACKINTOSH-HEMPHILL DRIVES transmit power for industry's metal rolling mills.

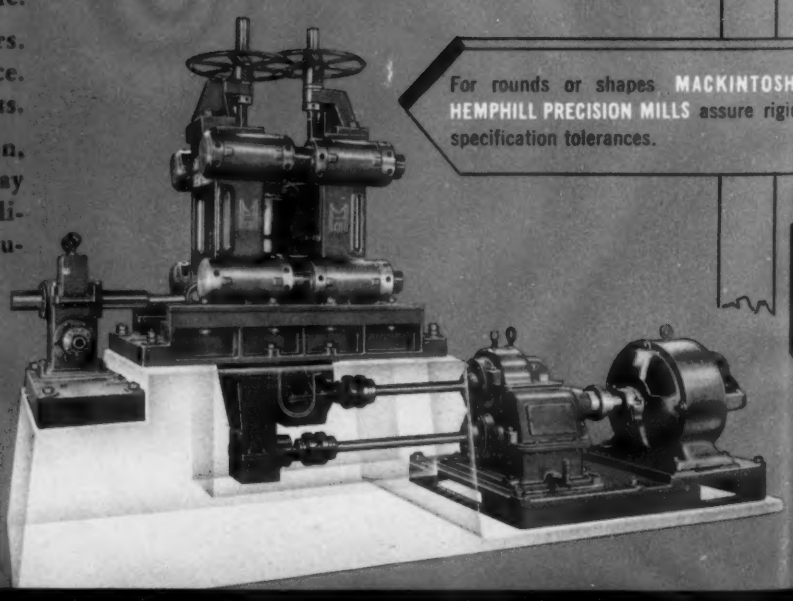


ROLLS WITH THE RED WABBLERS will make short work of your production rolling operations.

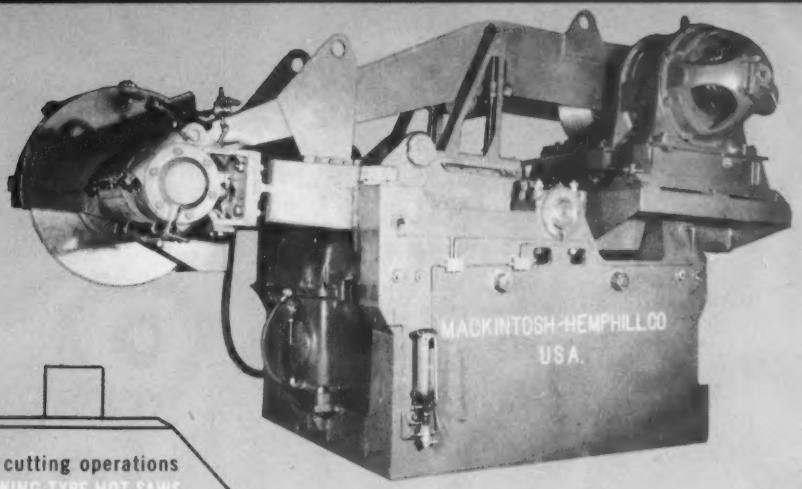
MACKINTOSH-HEMPHILL facilities for the design and construction of heavy industrial machinery include:

- A competent staff of experienced engineers.
- Metallurgists trained in metal mill practice.
- Two completely manned manufacturing plants.

In the present-day struggle with competition, higher costs, and lost productive time it will pay to keep your eye on what's new in the widely diversified types of production machinery manufactured by MACKINTOSH-HEMPHILL.

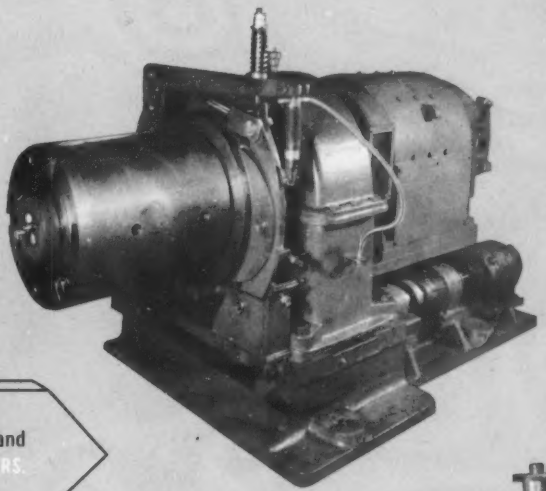


For rounds or shapes MACKINTOSH HEMPHILL PRECISION MILLS assure rigid specification tolerances.



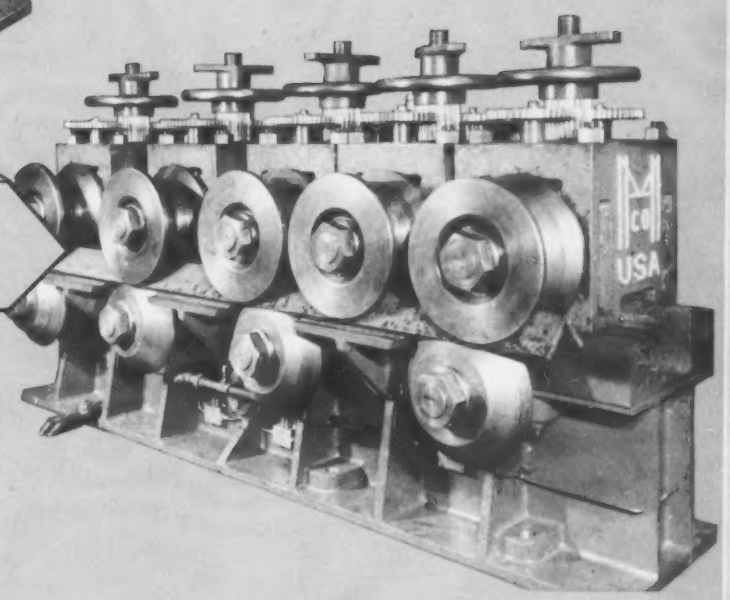
For high-speed cutting operations there are M-H SWING TYPE HOT SAWS and many types of shears.

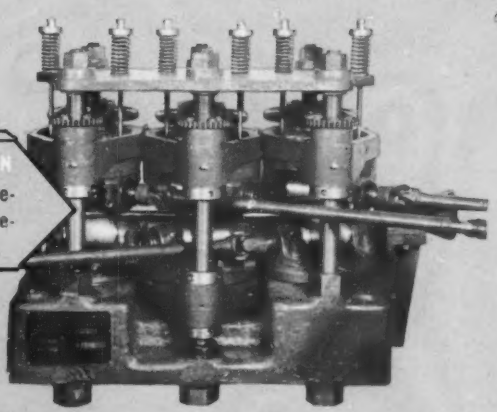
M-H HOLLOW-SPINDLE TURRET LATHES, together with heavy-duty lathes of many types, fulfill many special productioneering requirements.



For all types of metals, in all widths and coil weights, there are M-H STRIP COILERS.

There are M-H ANGLE AND SHAPE STRAIGHTENERS, too, in the M-H catalog of metal straightening equipment.



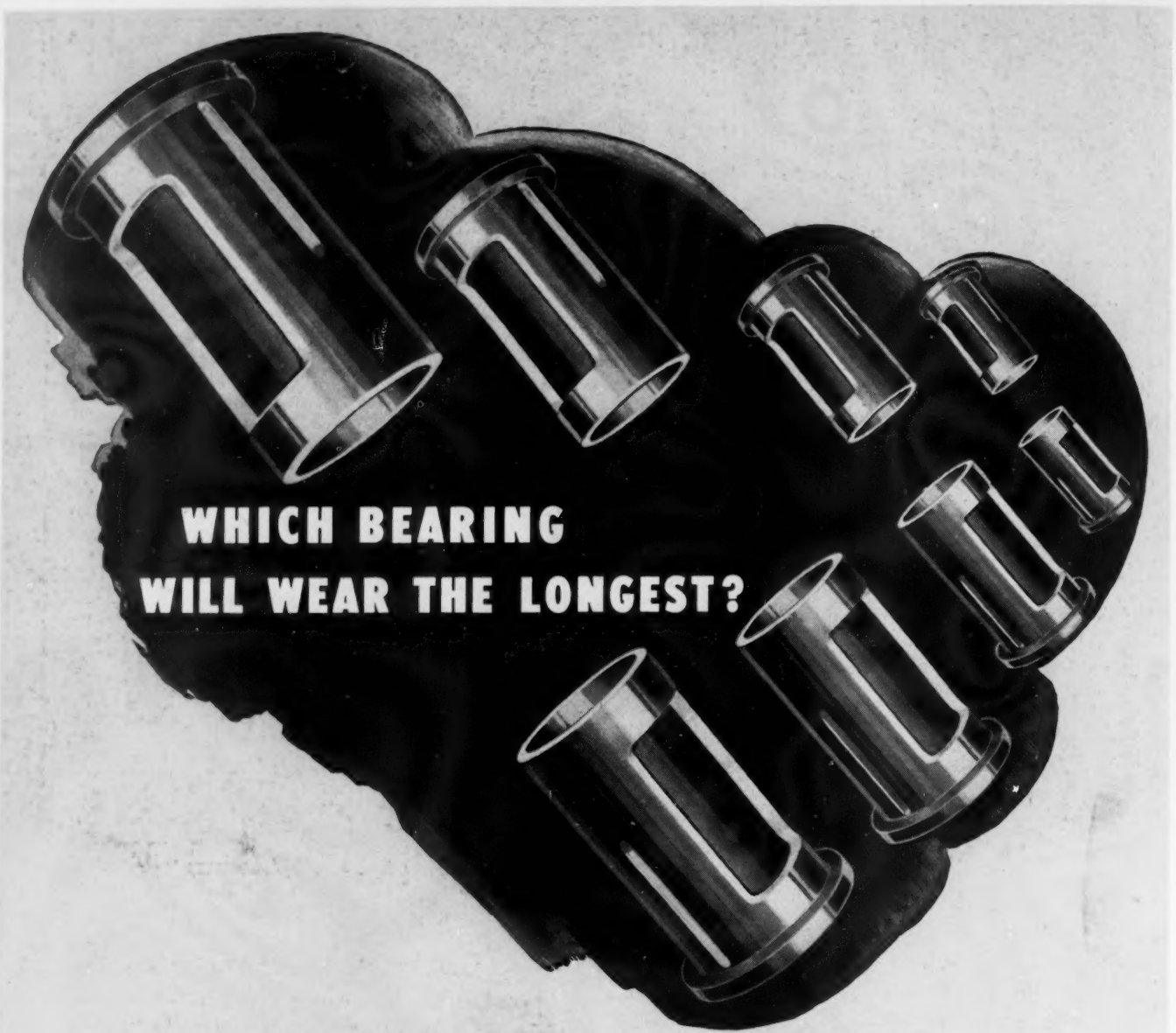


MACKINTOSH-ABRAMSEN STRAIGHTENERS leave no score-marks on finished products, require minimum setting-up time.

MACKINTOSH-HEMPHILL CO.

PITTSBURGH · MIDLAND, PA.

Makers of the rolls with the red wabblers



WHICH BEARING WILL WEAR THE LONGEST?

They're all exactly alike in size, shape and quality of bronze. But there's a mighty important invisible difference—the *alloys*.

That slight change in composition—often only a fraction of one per cent—can make a huge difference in service. Through years of research N-B-M has perfected scores of "minor" variations for different requirements which give bronze bearings and parts far longer life.

A new N-B-M alloy may be just the answer you're looking for.

N•B•M

BRONZE BEARINGS AND PARTS

AMERICAN Brake Shoe COMPANY

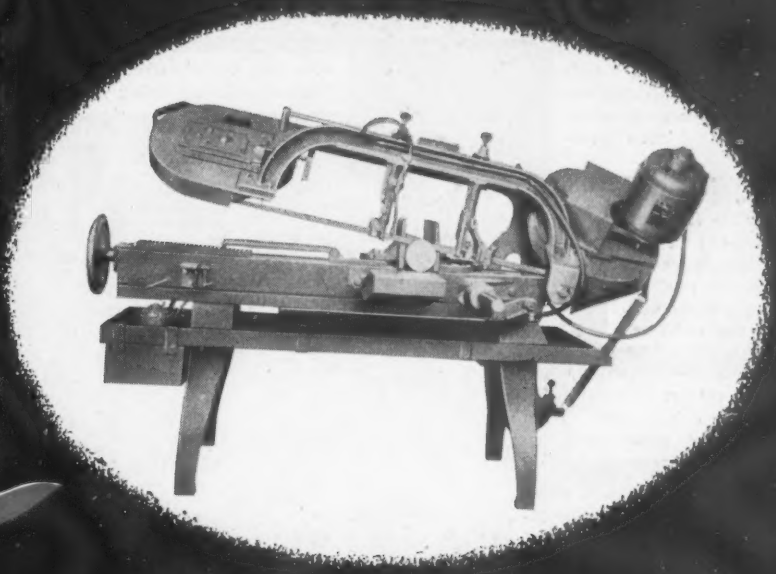
NATIONAL BEARING DIVISION

ST. LOUIS • NEW YORK

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA.• ST. PAUL, MINN. • CHICAGO, ILL.

SPOTLIGHT ON UTILITY

. . . . year in and year out . . . you'll be glad you have this handy tool . . .



WELLS No. 8
METAL CUTTING BAND SAW

Above photo shows a Wells No. 8 equipped with the new Wells Wet Cutting System—an economical accessory

SET a Wells No. 8 on the floor in your shop, and from that day on, you have at your service one of the most useful cutting tools available. It cuts bar stock, angles, square or round tubing—all types of metals and every size that can be fitted into it.

Use your Wells in the storeroom, tool room or for maintenance work. Move it to the job quickly and easily to save time and labor. Equip it with the new Wells Wet Cutting System for production work too.

Anybody can operate an easy-to-use Wells. In fact, the gravity-feed and automatic shut-off make it possible for one man to operate two or more Wells saws at the same time.

Thousands of Wells No. 8's are in use today . . . ample proof of their utility and worth. Where can *you* use one?

Specifications

CAPACITY: Rectangular	**8" x 16"**
(Special Guides)	**5" x 24"**
ROUNDS:	**8" Diameter**
MOTOR:	**½ H.P., A.C. or D.C.**
SPEEDS:	**Selective 60, 90, 130 feet per minute**
WEIGHT:	**Approximately 665 pounds**

Wells SAWS
THE SIGN OF SERVICE

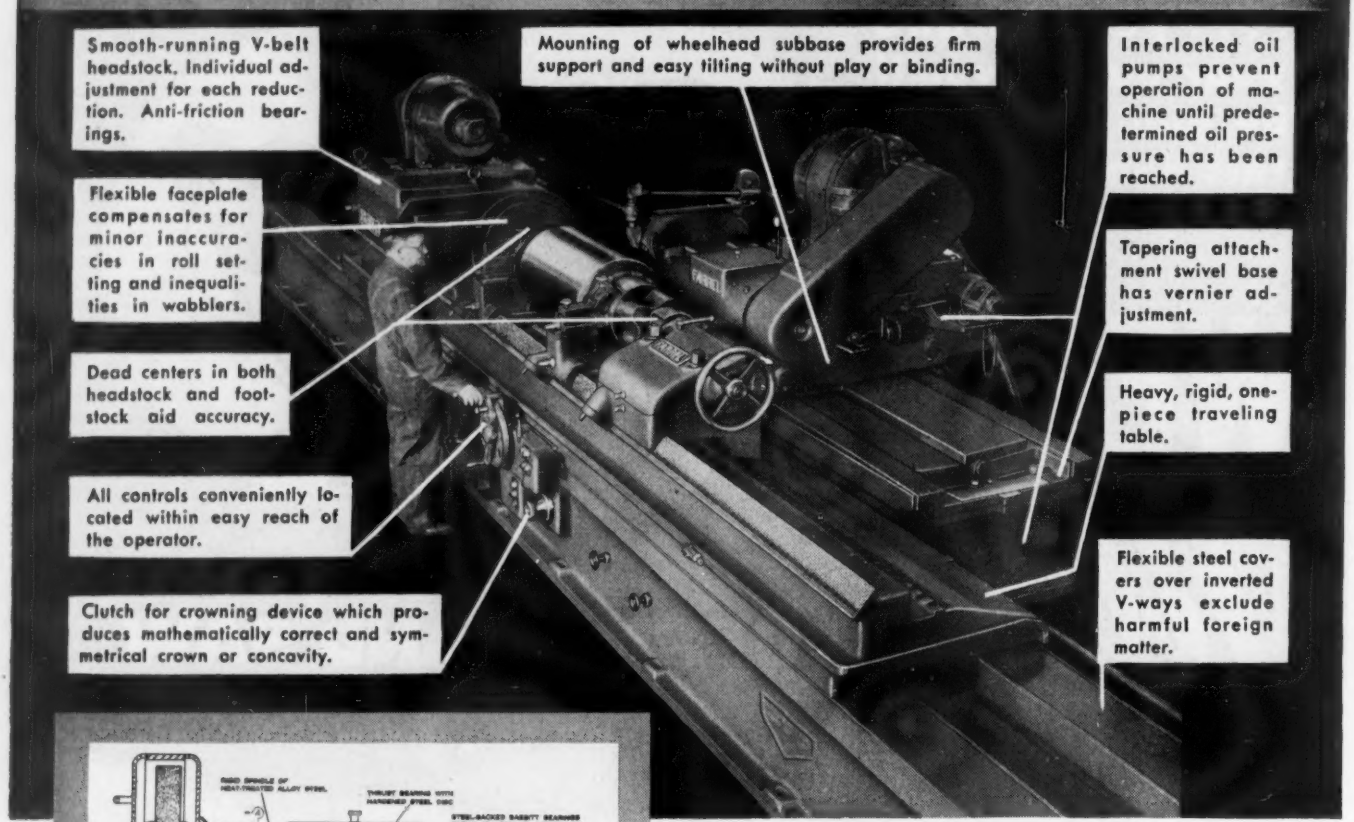
Wells

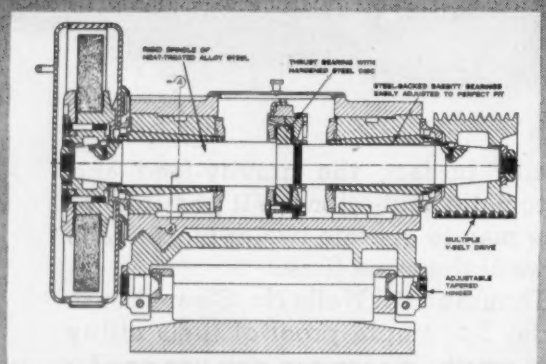
Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

SOME REASONS FOR THIS ROLL GRINDER'S PRECISION PRODUCTION ABILITY


Smooth-running V-belt headstock. Individual adjustment for each reduction. Anti-friction bearings.
Flexible faceplate compensates for minor inaccuracies in roll setting and inequalities in wabblers.
Dead centers in both headstock and footstock aid accuracy.
All controls conveniently located within easy reach of the operator.
Clutch for crowning device which produces mathematically correct and symmetrical crown or concavity.
Mounting of wheelhead subbase provides firm support and easy tilting without play or binding.
Interlocked oil pumps prevent operation of machine until predetermined oil pressure has been reached.
Tapering attachment swivel base has vernier adjustment.
Heavy, rigid, one-piece traveling table.
Flexible steel covers over inverted V-ways exclude harmful foreign matter.



Thrust on grinding wheel spindle is taken by hardened steel disc and two babbitted rings at the center, which permit free expansion of spindle bearings.

. . . and what they give you

The performance-improving features that Farrel has engineered into this precision roll grinder give you four-way reduction in roll maintenance costs:

1. HIGH OUTPUT—The type TT roll grinder can be used for either heavy roughing or producing a high mirror finish. It is extremely fast on both types of work.

2. EASE OF SET-UP AND OPERATION — Many features contribute to ease of set-up and simplicity of operation.

3. HIGH ACCURACY—Design and construction promote and maintain precision in grinding straight, convex or concave rolls.

4. SIMPLIFIED TAPERING—When equipped with a tapering attachment, the machine will grind both roll necks and finish grind the body with the same setting of the roll.

The complete story, including sizes and capacities, of the type TT roll grinder is given in Bulletin No. 113. Send in the coupon for your copy. FB-355

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, Stonington, New York, Akron, Pittsburgh, Chicago, Los Angeles, Tulsa, Houston, Charlotte

FARREL-BIRMINGHAM COMPANY, INC. (3.)
ANSONIA, CONN.

Please send me a copy of 32-page bulletin No. 113 describing Farrel Type TT Roll Grinders.

Name.....

Company.....

Address.....

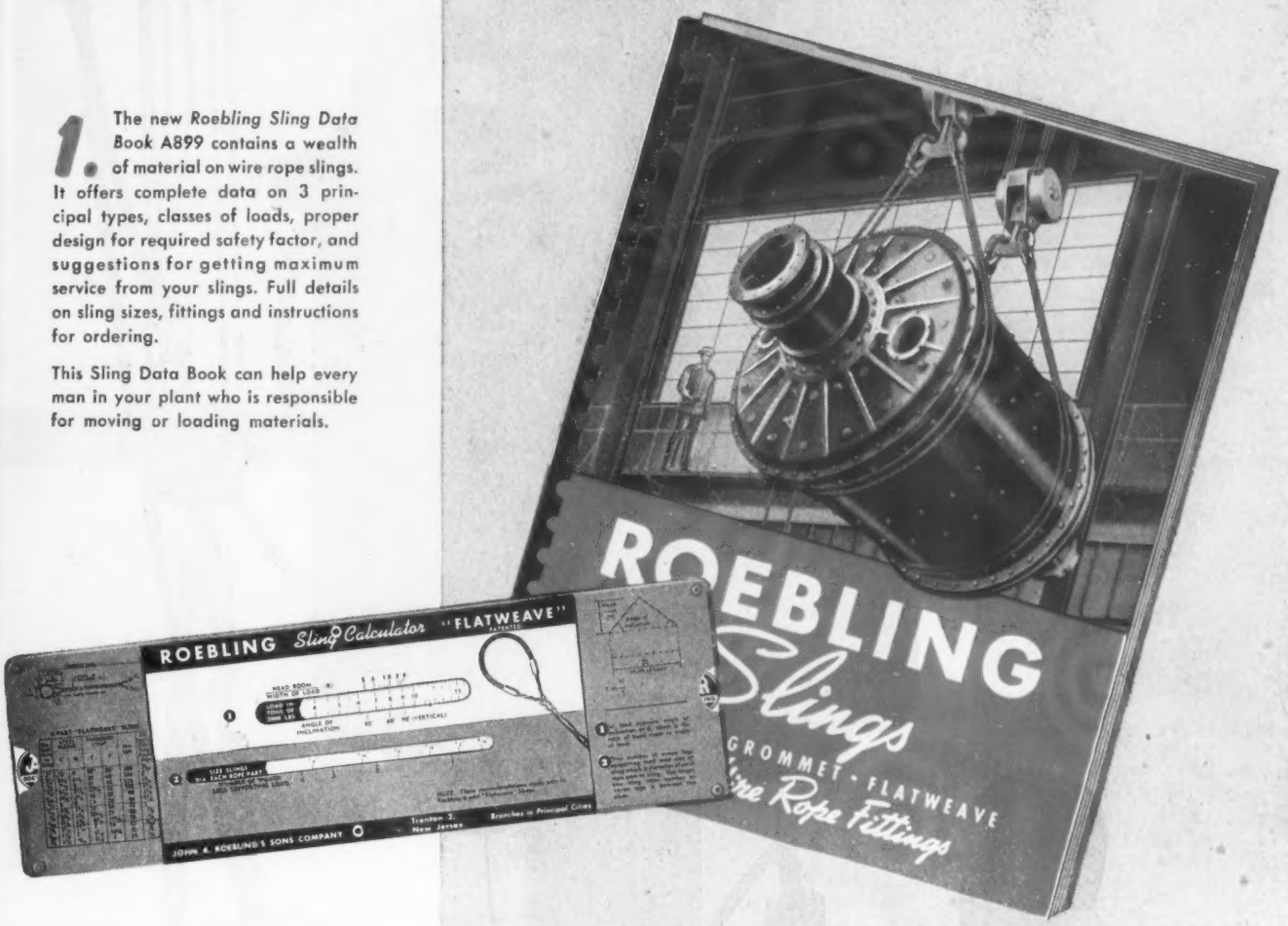
City.....State.....

Farrel-Birmingham

VALUABLE *FREE* AIDS TO SELECTION AND USE OF CORRECT SIZE AND DESIGN OF SLINGS

1. The new *Roebling Sling Data Book* A899 contains a wealth of material on wire rope slings. It offers complete data on 3 principal types, classes of loads, proper design for required safety factor, and suggestions for getting maximum service from your slings. Full details on sling sizes, fittings and instructions for ordering.

This Sling Data Book can help every man in your plant who is responsible for moving or loading materials.



2. A handy *Sling Calculator* is yours for the asking. It enables you to determine quickly and surely the safe working load for your Roebling Slings on every class of lift. May be used for wire rope or "Flatweave" slings. The durable surface has full printed instructions for use as well as handy tables and diagrams which will help you get the most from your slings.

Roebling standard slings are available for general use, although many Roebling slings are designed to handle specific loads. Whether you require a standard or a special sling, your inquiry and order will receive the careful attention of Roebling engineers.

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Gentlemen: Please send me without obligation:

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☐ Roebling Sling Calculator

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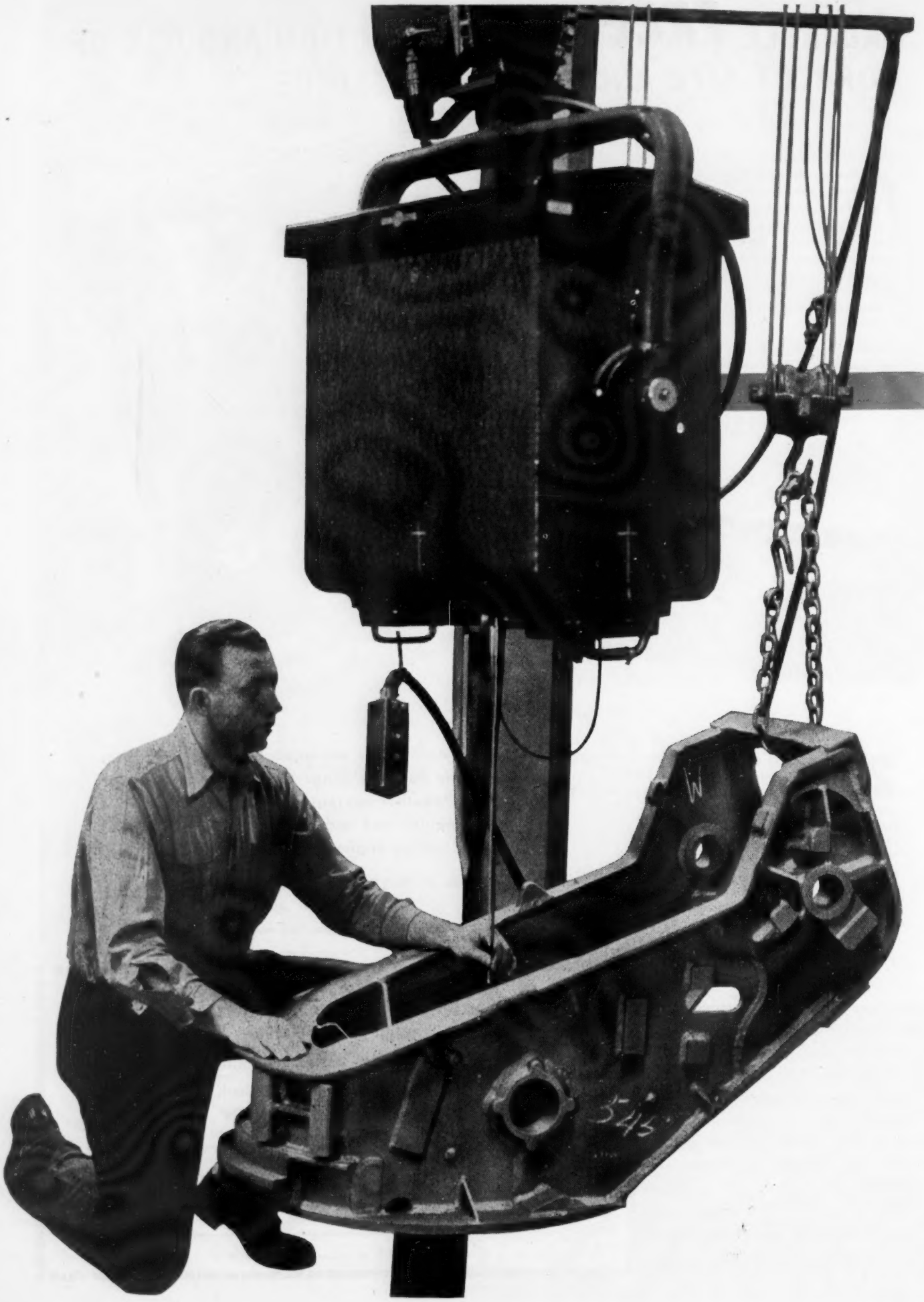
*Company*_____



HERE'S WHY G-E X-RAY UNITS PAY REAL DIVIDENDS

The experience of hundreds of satisfied users proves that G-E X-Ray Industrial Units can be relied upon to pay real dividends—both scientific and economic.

No matter what you make there's a G-E X-Ray Industrial Unit available in a voltage range and with a mounting structure to meet your need. And you can be sure that your G-E X-Ray Unit will be a profitable, dividend-paying investment. With it you can . . .

INSURE QUALITY. With a G-E X-Ray Industrial Unit in your plant, you and your customers gain the benefits of using x-ray as a guide to the development and control of improved foundry and welding techniques.

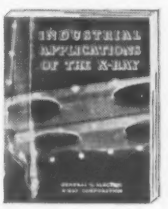
CUT PRODUCTION COSTS. Many users of G-E X-Ray Industrial Units have found that improved foundry techniques, based upon x-ray examinations of pilot castings, doubled the yield from a single melt.

CUT REJECTS. Owners of G-E X-Ray Industrial Units report that improved foundry techniques reduce to almost nothing the cost of replacing defective castings. In some cases, this saving alone has been enough to pay for the x-ray equipment. And customers appreciate that flaw-free castings provide them substantial savings in machining costs, increased productive machine time, and longer cutting tool life.

CAN X-RAY BE APPLIED TO YOUR BUSINESS? The chances are it can. And to help you decide, G-E X-Ray offers you the services of its corps of experienced x-ray engineers to assist you in selecting the right unit to meet your need. And if x-ray cannot be applied effectively and economically, they will be the first to tell you.

GENERAL ELECTRIC X-RAY CORPORATION

TWO INTERESTING BOOKLETS AVAILABLE



Use the handy coupon to request your copy of the interesting 36-page booklet, THE STORY OF X-RAY, and the illustrated, fact-filled 34-page INDUSTRIAL APPLICATIONS OF THE X-RAY. There's no obligation, of course.

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MM 712

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Bring your workers up to date on these four methods of joining Alcoa Aluminum. These new films are available for both 16 mm. and 35 mm. sound motion picture projectors. May be borrowed or purchased.

Call the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Penna.

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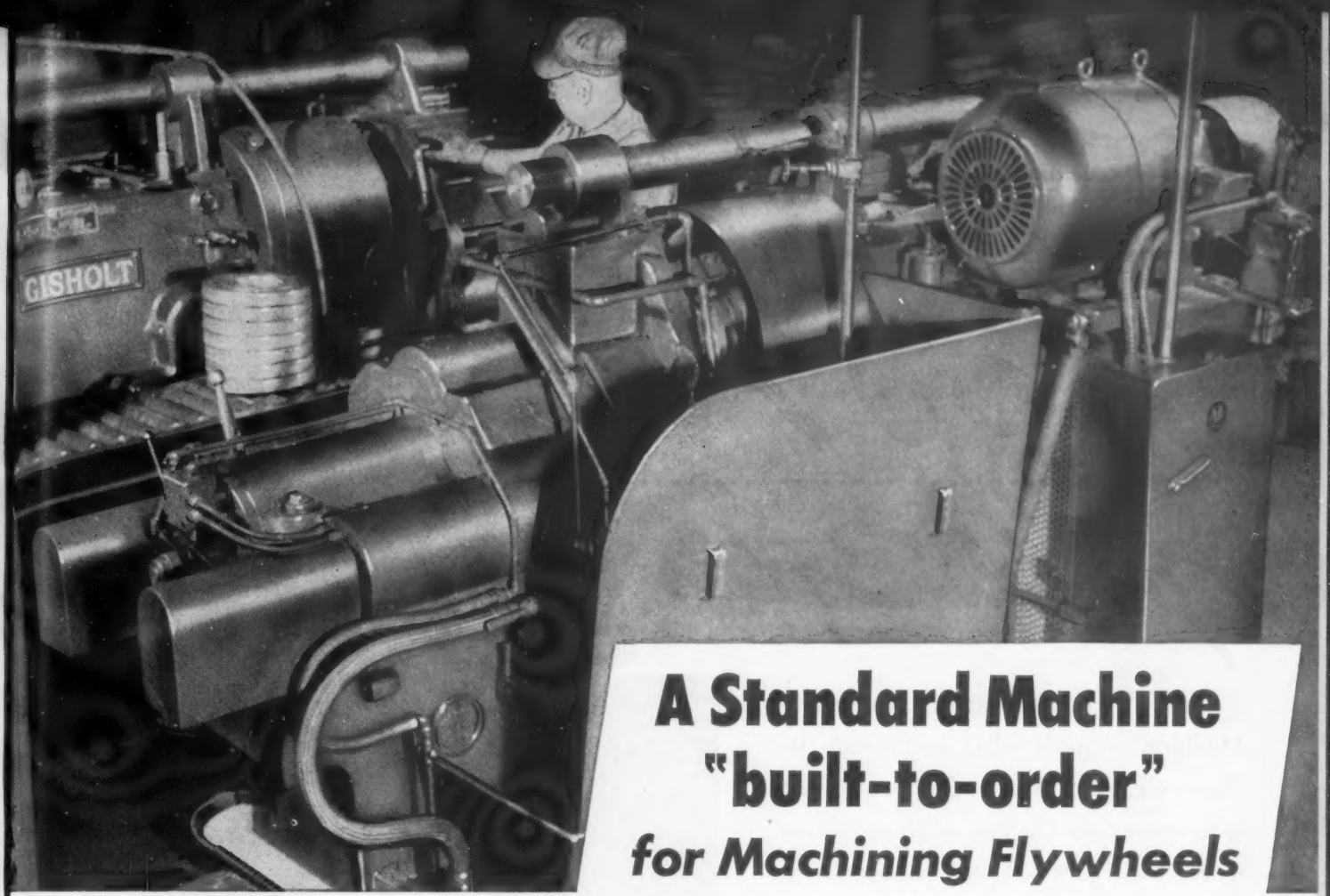
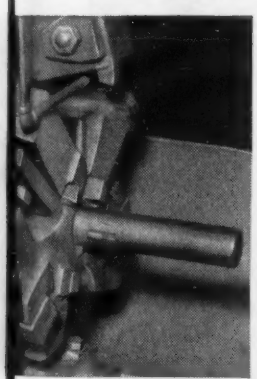
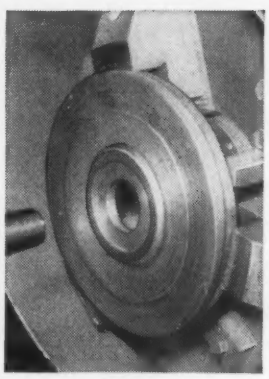


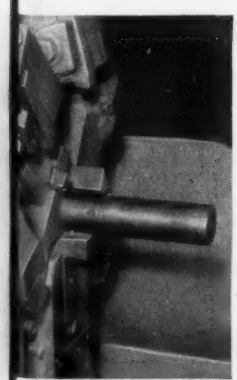
A Standard Machine "built-to-order" *for Machining Flywheels*

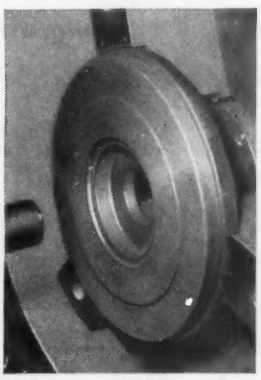
THE GISHOLT SIMPLIMATIC





Plunge type tooling for first operation in machining cast iron flywheels.





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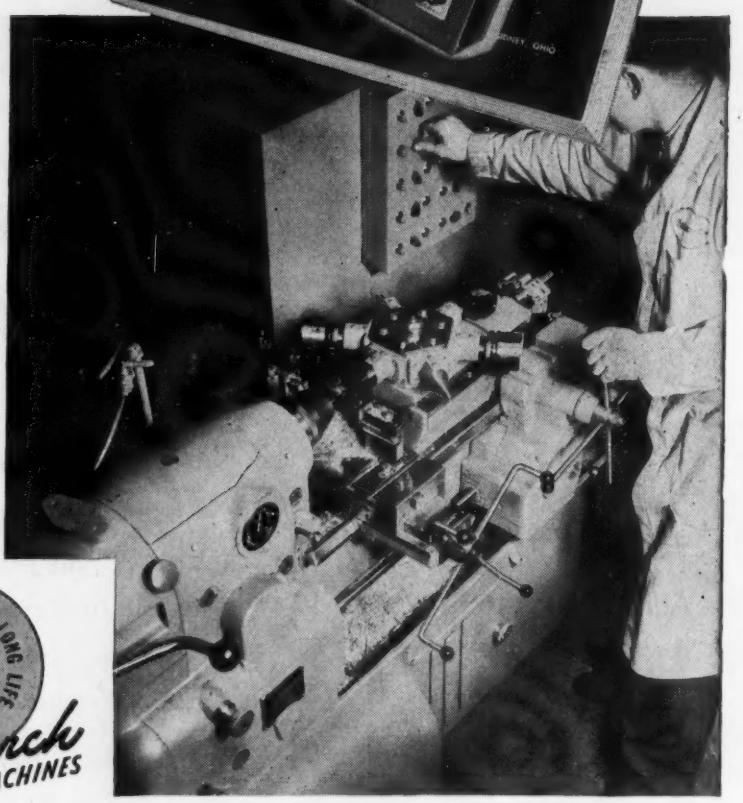

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The Metalworking Industry Reports on Prospects for 1947

STEEL's Annual Forum on Technical Progress in Metalworking

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 119 NO. 27 DECEMBER 30, 1946

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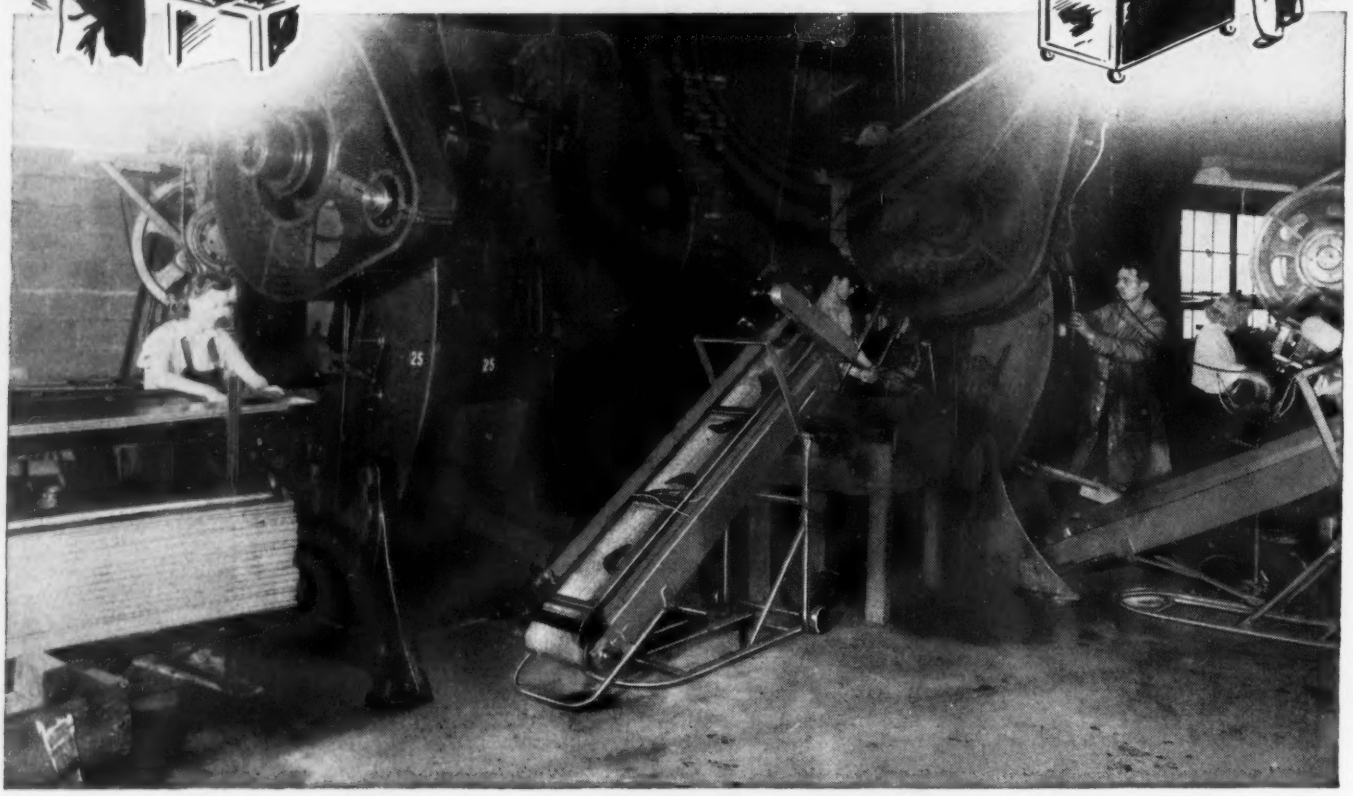

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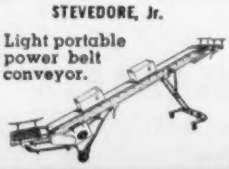
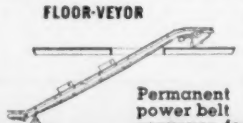


FLOOR-VEYOR



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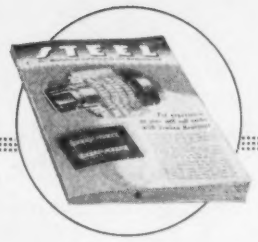


December 30, 1946

The Turning Point

Nineteen Forty-six has been a drab year compared with its predecessor. During the 12 months now ending there were no military victories or V-E or V-J days, no spectacular events comparable to the dropping of the bomb on Hiroshima, no superlatives in the unexpected such as the unseating of Churchill and the death of Roosevelt and few positive signs of progress and achievement such as characterized the unusually eventful year of 1945.

Instead, 1946, on the whole, was a year in which most inspired men who worked hard reaped disappointing rewards. In international affairs statesmen put forth great energy to win accord among nations with results that are only faintly encouraging. In our nation, government officials wasted ten precious months pursuing unsound policies before they saw the error of their ways. In industry, management struggled against hopeless odds to get production going on a smooth basis with results that were far from satisfactory. Labor struck for higher wages and other benefits and won them in part, only to discover later that rising costs had made their victories hollow ones.

In short 1946 was predominantly a year of frustration and it could be written off the books on that score with complete justification if it were not for one important event and its implications. That event was the election of Nov. 5 and the implications are those which arise from the fact that the voice of the American public as expressed in its vote on that day not only calls for a return to a semblance of a relatively free private enterprise system in the United States in peacetime but also swings the nation sharply toward center and to the right at a time when most of the world continues to drift toward the left.

This action of the people in calling a halt to foolishness and futility may herald a bright new era of progress. Already it has produced marked changes in the executive branch of government. Soon it will be reflected in a more positive way in the behavior of the new Congress. In time it will influence decisions of the now largely "packed" judicial branch. Eventually it may turn the tide toward more favorable developments in international affairs.

Therefore, while history may properly catalog the old year as one of disillusionment, frustration and disappointment, it must also record the fact that it witnessed a turning point in the attitude of the people that may prove to be tremendously significant.

• • •

ADJUSTMENT IN SCRAP: An interesting feature of iron and steel markets at the year-end is the almost sensational situation in scrap. In some instances quotations of steelmaking scrap have soared to figures that are 60 per cent above the wartime ceilings permitted by OPA and represent the highest prices quoted for this material since 1917.

In spite of these high prices and the buoyant market now existing, scrap tonnage still is moving slowly. This sluggishness tends to bolster the opinion of many authorities who insisted throughout the period of scrap shortages that price alone was not the primary factor. Most men in this school of thought contended that an acute shortage actually existed and that higher prices could bring out only limited tonnage.

While this explanation is plausible up to certain point, it must be remembered that during the war numerous other factors served to dull the incentive of price that operates in normal times. Given a relatively free market, good demand, fair weather and a little time, prices can succeed in bringing out tonnage where artificial means failed.

This point probably will be illustrated during the

(OVER)

AS THE EDITOR VIEWS THE NEWS

next few months. There will be fantastic prices, stiff customer resistance and considerable grief during the period of adjustment. Then will emerge a normal market with more adequate supplies and more sensible quotations. —p. 35

• • •

LEGALIZED EXTORTION: When Harold Burton became a Supreme Court justice, we said his appointment marked a refreshing reversal of the trend of court "packing." Justice Burton has justified this appraisal in his dissent, with Justice Frankfurter, against the majority decision in the now famous Mt. Clemens pottery case.

The minority opinion, written by Justice Burton, implies that the majority opinion of Justices Murphy, Black, Reed, Douglass and Rutledge places the court in the position of "writing" a law, not intended by Congress, that is contradictory to established practices in industry. Justices Burton and Frankfurter foresaw the trouble the majority decision would cause.

That trouble is coming to light in the scores of suits for retroactive portal-to-portal pay which if upheld, will extort billions from employers and will ruin numerous companies. The new Congress may help the situation by limiting the time retroactive claims must be honored, but this will be feeble justice compared with the enormity of the wrongs now being inflicted. —pp. 37, 51

• • •

MORE CARS IN 1947? Government agencies again will use their influence to stimulate the construction of more cars and locomotives for American railroads. The announced objective is to procure enough steel to produce 10,000 freight cars monthly throughout 1947.

This is a tough assignment, but there is a chance that efforts which failed in 1946 may prove effective in 1947. There are several reasons for this more hopeful prospect. One is that the belated ICC decision granting rate increases gives the railroads an improved financial outlook. A second is that steel should be more plentiful in the new year than in 1946. Third is the decision to give domestic railroads certain priorities over the demands of foreign countries for rolling stock and motive power.

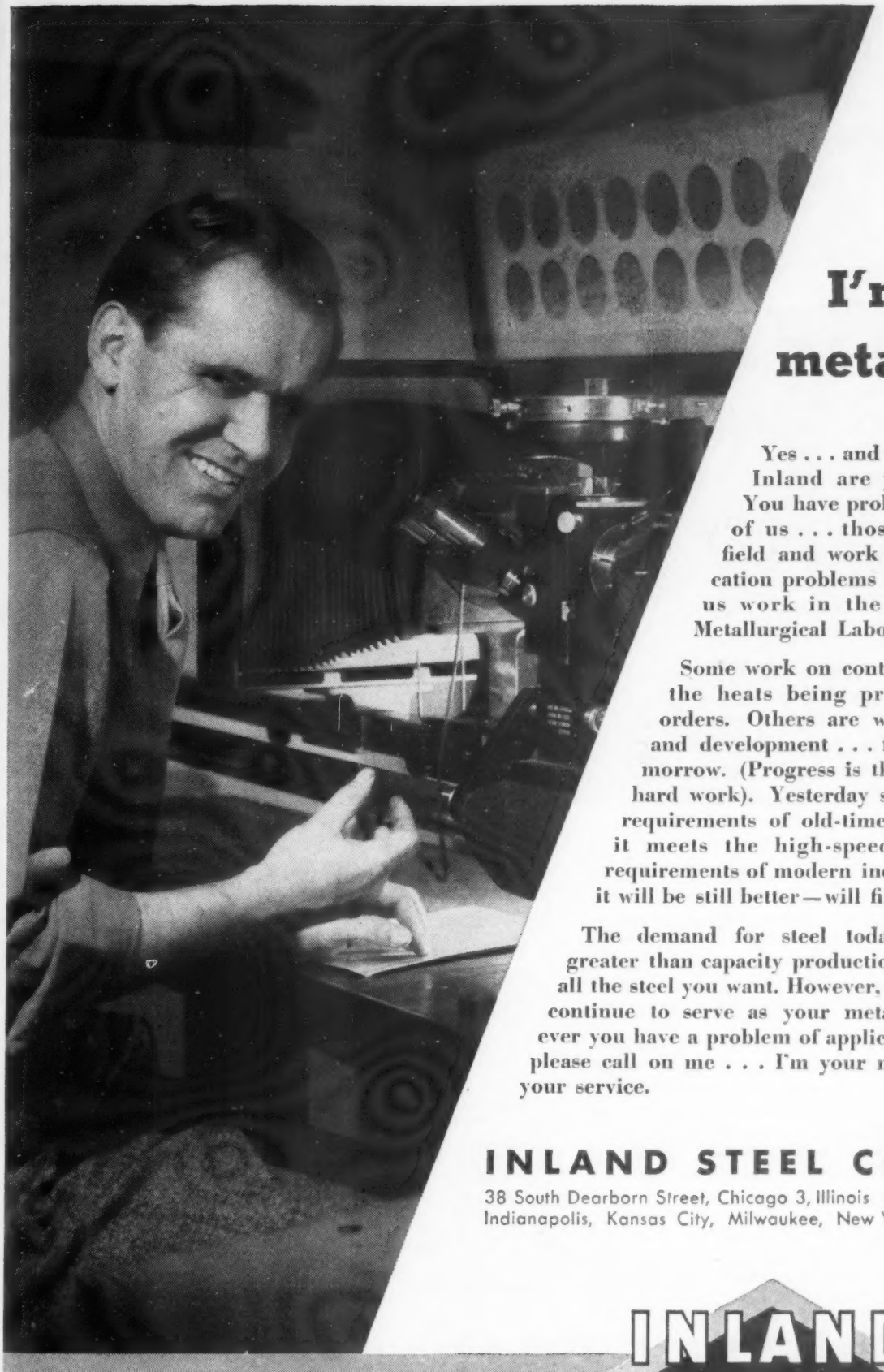
American Railway Car Institute wants to exceed the 10,000 car-a-month objective. It seeks to achieve full capacity at 14,000 cars monthly as quickly as possible. Locomotive builders also wish to increase output. 1947 should be a better year for railroad equipment. —p. 38

SIGNS OF THE TIMES: A directory published by the National Research Council shows the personnel in industrial research laboratories in the United States in 1946 numbers 133,515 (p. 54), a gain of 90.6 per cent since 1940. . . . Five-month old strike at Long Manufacturing division of Borg-Warner was settled after the union approved an average wage increase of 17½ cents an hour. In the union agreement ending the strike was a clause (p. 52) "condemning" fellow union workers at Continental Motors for increasing their daily production of clutches from 1200 to 3000 during the Long strike. . . . A medium-size, all-purpose farm tractor requires 1543 pounds of steel (p. 63), consisting of 911 pounds of hot and cold-rolled bars, 423 of sheet and strip, 58 of terne plate, 52 of structural steel, 50 of billets and lesser amounts of pipe and tubing, wire and plates. The weights are of rough steel before fabrication. Steel in standard bolts, nuts, lock washers and rivets is not included. . . . Veeder-Root Inc., holding open house in connection with the opening of a plant addition (p. 67), exhibited 100 typical pieces of modern equipment in which its counters are used. The display reflects the marked expansion in the field of mechanized counting that has taken place since the company pioneered in making counters for bicycles. . . . Just before industry began to cut operations in observance of Christmas (p. 114), industrial production had regained 93 per cent of the ground it had lost during the coal strike. . . . A Michigan automotive equipment manufacturer has developed a system of control of material and workmanship (p. 70) in which one of every ten employees acts in a testing or inspection capacity. Inspection is supervised by the men who design the products and the tools on which the products are made. . . . The interim report of the government's Guaranteed Wage Study Staff, portions of which are abstracted in last week's and in this issue (p. 47), is based upon a study of 188 existing plans on which the staff was able to obtain detailed information. These 188 plans cover 68,645 employees working in about 500 business and manufacturing establishments.

Happy New Year!

E. C. Shane

EDITOR-IN-CHIEF



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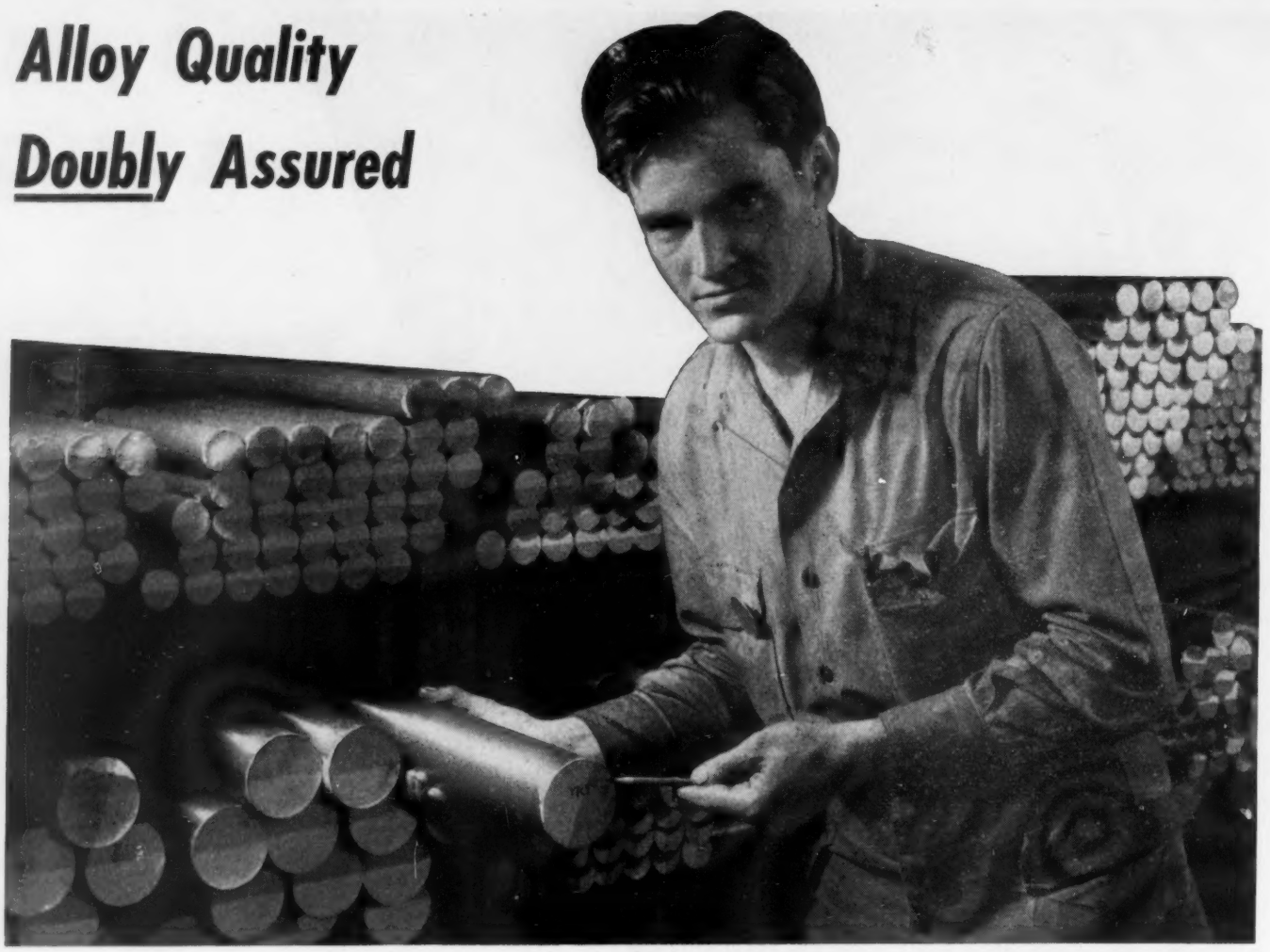

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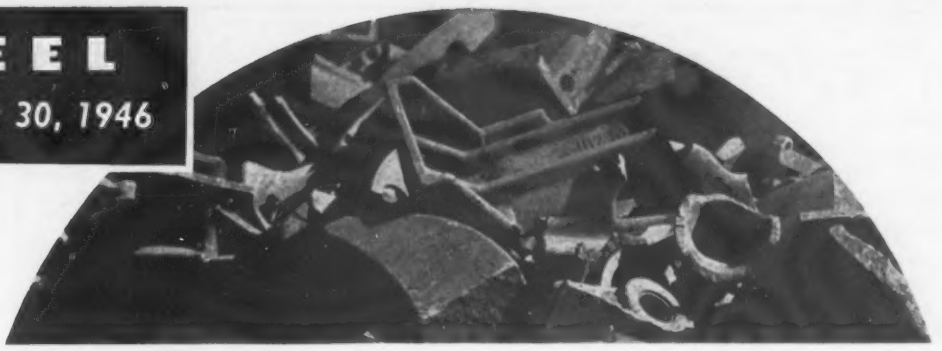


Scrap Scarcity Limits Steel Output

Buoyant market, sending prices up 60 per cent over OPA ceilings and to highest levels since 1917, brings out only limited quantities. Signs of buyer resistance appearing

Scrap will vie with labor as a factor in determining how much steel will be produced during the next few months

SCRAP, continuing in short supply despite recent sharp advances in prices, will be a limiting factor in steel production throughout the winter and spring months.

A sensationally buoyant market, which has sent quotations of steelmaking scrap up more than 60 per cent over the wartime ceilings enforced by the Office of Price Administration, has not brought out enough material to alleviate the scarcity.

STEEL's composite price for steelmaking scrap has increased from the low OPA ceiling of $19.17 to $31.08, most of the advance occurring since the middle of December. Present prices are the highest since 1917.

Some signs of buyer resistance to the present prices is noted. It generally is agreed that scrap interests were entitled to a substantial increase over OPA ceilings due to increased costs of collecting and handling material, but buyers question whether increases to the extent now attained are justified. Some steelmakers believe a continuation of the upward movement might necessitate further revisions in steel prices.

The fact that the current buoyant market is increasing the flow of scrap only slowly refutes those consumers and dealers who before the demise of OPA contended the price was not high enough to bring out material and supports others who maintained that the shortage was actual.

Weather conditions will cause a seasonal lag in collections and preparation in the months ahead.

Steel mill inventories of scrap are modest and with winter at hand consumers are wary of dipping into them. Some mills have been unable to restore operations to pre-coal strike levels because scrap is not available.

The acute scarcity of scrap has given rise to some undercover deals involving the bartering of scrap for hard-to-get steel products which in turn are offered at prices considerably above mill levels.

Expectations as to the future course of scrap prices are mixed. Some steel interests believe they will break after the first of the year as result of dumping of hoarded material. Others believe prices will hold near the present level for as long as steel mills continue at present operating levels, with the possibility of some further increase. Should labor troubles develop to close the steel mills, scrap prices are expected to break sharply.

Considerable confusion has existed in the scrap market since the mid-December break-through of prices and the situation varies in steelmaking centers. These variations, as reported by STEEL's district editors:

Pittsburgh—Recent sharp advance in iron and steel scrap prices has stimulated flow of material to consumers' yards, but tax considerations, inclement weather and possibility of still higher prices are major retarding factors in collection, segregation and shipment of scrap to steel mills and foundries. Higher prices will not immediately permit collection of substantially more scrap from remote areas due to adverse weather conditions, but the present price level likely will free considerable tonnage held by those who had speculated on higher prices.

With but one or two exceptions mills have a working inventory of scrap, estimated at 2 to 3 weeks' supply. Stockpiles were augmented somewhat during the coal strike period when steel and foundry operations were curtailed about 50 and 30 per cent, respectively. However, improvement in scrap shipments to date

has not yet increased to the point where they match or exceed consumption rate.

Signs of growing buyer resistance to present high scrap prices are noted, with a few interests withdrawing from the market. This trend will become more widespread should another upward "break-through" of present price level occur.

It is pointed out present price of $32.50 per gross ton Pittsburgh for open-hearth grades includes broker's commission, freight absorption and transportation tax.

Trade interests point out that the $32.50 price means little when considered in light of reported sales at $35 per ton delivered Weirton, $34 at Detroit, $32.50 to an Eastern Pennsylvania consumer and $32 at Sparrows Point.

Railroads are attempting to restrain the upward trend in prices for their lists for obvious reasons, although there are reported sales of railroad specialties as high as $36.50.

No. 1 cupola cast has sold here for $45.

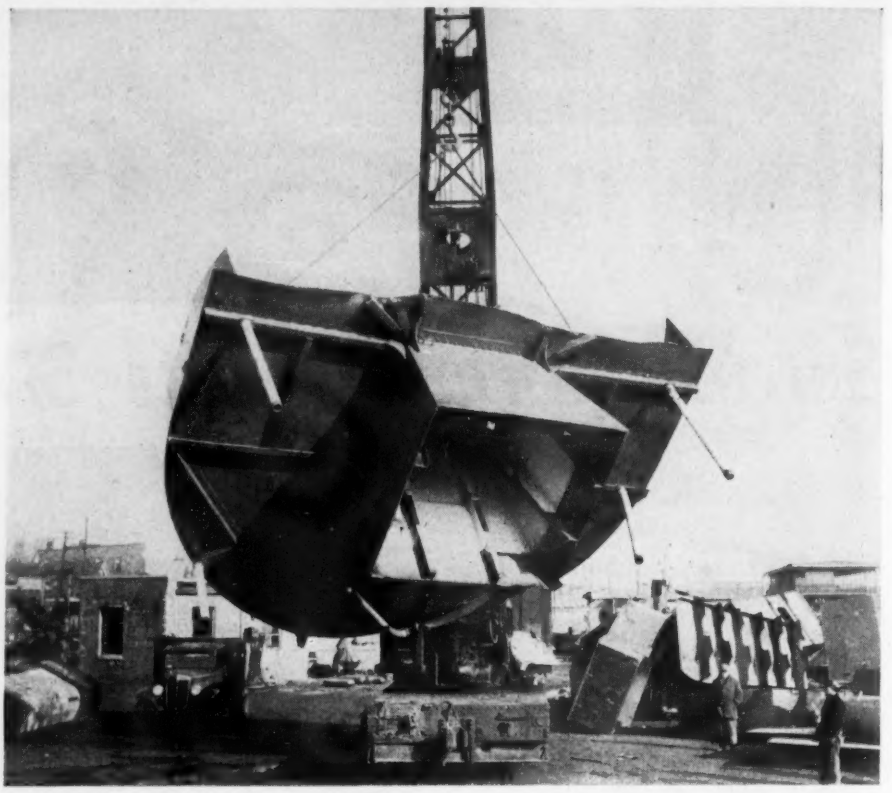
Unprepared scrap prices have not settled down to any specific pattern, although in most instances the price spread between prepared and unprepared material has increased considerably from the $3 per ton permitted under OPA. However, extensive trading for unprepared scrap to be used in exchange for badly needed finished steel has forced unprepared scrap prices up $8 to $10 a ton.

Scrap Around $30 at Detroit

Detroit—On the basis of latest orders reported here, mills have raised the going price on open-hearth scrap better than $5 per ton to $27.50-$28.00, dealers' buying price, which makes the delivered price in the $30 range. The previous 50-cent broker commission is out, and brokers are now taking what they can get competitively.

A free market appears to have been restored on borings and turnings, both now being quoted at $22.50-$23, dealers' buying price. Similarly, electric furnace material is again on a free basis, although the price range is estimated at around $2, quotations being $28.50-$30 per ton.

The additional increase in the mill level of scrap prices is aimed at driving out undercover deals which have been widespread throughout the country and more than a little disruptive. These were the arrangements where scrap was traded for finished steel on approximately a 5 to 1 basis, with scrap sold to the mill at the former OPA price ceiling, while being purchased from dealers for as much as $10 or $12 over this figure, the loss being made up on premium price for the finished steel. By raising the going mill price, the loss incurred on scrap in undercover deals may be nearing the point where they are unprofitable. It is known that there is increasing reluctance on the part of steel buyers to pay the exorbitant premium being asked.



Shipbreaking is expected to supply a fair tonnage of scrap for steelmaking. Here a 12-ton section that was intended for a gun emplacement on an aircraft carrier heads for the steelmaking furnaces at Bethlehem Steel Co.

One of the latest offers in this area involved 100,000 tons of 18, 20 and 22-gage hot-rolled sheet, with delivery promised at a rate of 8600 tons a month starting in January, and price $160 per ton for the first six months and $140 for the next six months.

Birmingham Expects More Scrap

Birmingham — Scrap market here is marked by unprecedented demand and a short supply sending prices still higher. Heavy steelmaking scrap is $28 a ton. Brokers report new prices have started a movement of supplies and most of them expect substantial tonnages to make their appearance after the holidays.

Further Price Increases Expected

Youngstown — Iron and steel scrap prices have jumped to around $32 to $32.50 a ton within the last few days, as scrap-hungry steel plants bought considerable tonnage here.

However, supplies are still comparatively small, and predictions are that heavy melting grades will go up still further to possibly $40 or about double the OPA ceilings of $20 that prevailed all during World War II.

Some steel sources, however, are hopeful of a break in the price soon after Jan. 1 when they expect some "dumping" of scrap. One executive said he understood some dealers have considerable scrap on hand or coming in which they are unwilling to speed up until after Jan. 1 so they can throw it into 1947 incomes.

St. Louis Scrap Reserves Decline

St. Louis—Scrap reserves at mills remain around 30 days, and at two weeks or under at foundries. The trend is steadily downward, however, due to a gradual decline in shipments. Aside from low shipments, melters' stocks are not going up because of production uncertainties the new labor wage demands have created, and because a measure of resistance is developing to rising scrap prices. Indications are that when scrap and pig iron stocks reach a point making it feasible, scrap order cancellations will begin to appear.

Foundries especially resent paying $12 to $15 above pig prices for scrap, but November iron allocations are coming through only now and they cannot save by increasing the pig iron ratio. Found-

(*Please turn to Page* 137)

Industry Maps Campaign Against "Portal-to-Portal" Pay Suits

Chamber of Commerce polls members on proposed amendments to Fair Standards Act, upon which suits are based. Legislation to limit retroactivity of claims under federal statutes expected to be enacted by new Congress

CAMPAIGN to relieve employers of retroactive "portal-to-portal" pay liabilities, threatened by scores of suits filed by union attorneys, was launched last week by the Chamber of Commerce of the United States.

Spurred by a flock of suits filed recently asking for back travel pay—at twice normal overtime rates—the chamber polled its membership on a series of amendments to the Fair Labor Standards (wage-hour) Act on which the suits are based. The suits, which eventually may ask for several billion dollars from industry, were encouraged by a Supreme Court decision in the Mt. Clemens Pottery Co. case in which the tribunal ruled the workers were entitled to pay for time spent on company property preparing for their jobs (See also page 51).

The amendments to the Fair Labor Standards Act which the Chamber of Commerce hopes to present to Congress with the overwhelming support of American business would:

1—Limit to some period, less than 8 years, the time during which employers could be held liable retroactively.

2—Define clearly what occupations are in interstate commerce and thus are covered by the act.

3—Validate compromise settlements with groups of workers for back pay under the decision.

From the standpoint of the many companies who may have violated the Fair Labor Standards Act unwittingly, failure of the 79th Congress to enact the so-called Gwynne bill may prove a major tragedy. This bill, introduced by Rep. John W. Gwynne (Rep., Iowa), would have limited retroactivity of claims under all federal statutes. It passed the House with a 2-year limitation period, and the Senate with a 3-year limitation. The shutting down of Congress during the summer prevented a compromise between the two versions by the usual conference route.

Mr. Gwynne has redrafted his bill and hopes to get it through the 80th Congress with an extra provision for relieving a company from all liability when it tried in good faith to obey the particular law under which future suits are brought. Current expectations are that this time he will have good chances of getting approval in both houses of a 2-year limitation period. Mr. Gwynne also expects to insert a provision for protecting well-meaning defendants in suits already in the courts.

Fabricators Decline CIO Contract Extension Offer

Metalworking companies have refused Philip Murray's request that they extend their contracts with the United Steelworkers of America, declining to extend their agreements as long as there is "any provision that they necessarily go along with the terms negotiated between the union and basic steel."

Fabricators, who employ almost half of the 853,000 membership of the CIO United Steelworkers, insist it is unfair to impose steel industry terms on them.

Mr. Murray's plea was turned down in a statement by the Tri-State Industrial Association in Pittsburgh issued following announcement by Mr. Murray, union president, that the fabricators would be asked to extend their contracts to an indefinite date until the union has reached an agreement with the basic steel companies.

The fabricators are seeking to avoid a repetition of experience last January during the steel strike when their industry, as well as basic steel, sagged to the lowest point since 1893.

Present, Past and Pending

■ CANADIAN FREIGHT RATE HEARING POSTPONED

OTTAWA, ONT.—Hearing on an application of the Canadian railroads for a 30 per cent freight rate increase has been postponed to Feb. 11 by the Board of Transport Commissioners.

■ J. & L. STEEL BUYS CONCENTRATING PLANT

PITTSBURGH—Jones & Laughlin Steel Corp. has purchased for $4 million the scale iron ore concentrating plant built by the government during the war for $7 million at the company's Benson mines in St. Lawrence County, New York. The plant can crush and process 2.4 million tons of ore each year into 800,000 tons of concentrates ranging from 60 to 64 per cent iron. The company plans additional development.

■ NEW MULTI-PURPOSE LOCOMOTIVE INTRODUCED

NEW YORK—Introduction of a new Alco-GE 1500 horsepower multiple-purpose locomotive was announced last week by Robert B. McColl, president, American Locomotive Co. This provides the company with the first complete postwar line of diesel-electric locomotives. Early this year the company introduced a 6000 hp road locomotive and 4500 hp freight locomotive.

■ PLATINUM METALS INDUSTRY NEARING NORMAL

NEW YORK—The platinum metals industry is returning to normal conditions under the force of supply and demand operating in a market freed of price control since April 29, Charles Engelhard, president, Baker & Co., stated last week. During the first nine months of 1946 the United States sales of platinum to all consuming industries averaged 19,775 troy ounces.

■ MACHINE TOOL INDUSTRY'S SHIPMENTS DECLINE

CLEVELAND—Machine tool industry shipments in November dropped to $26,176,000, compared with $29,140,000 in October, the National Machine Tool Builders' Association reported. New monthly lows for the year were recorded in November for new orders, cancellations, and backlog.

■ INDUSTRY EXPECTED TO DRIVE FOR LOWER COSTS

PHILADELPHIA—Intensified drive by industry to increase productive capacity and cut costs with better machines is expected during 1947 by William L. Batt, president, SKF Industries, Inc.

■ RECORD-BREAKING CONSTRUCTION PREDICTED

WASHINGTON—Government officials last week forecast record-smashing construction activity in 1947, the Commerce Department predicting nearly $22 billion worth of building of all kinds, with housing about 40 per cent of the total.

Press Drive for More Freight Cars

Government agencies seek to accelerate domestic car building program. Builders may get enough steel for 10,000 units monthly

DETERMINED efforts are being made to accelerate the domestic freight car building program which lagged all through 1946 because of a shortage of steel and other materials.

Last week it was reported John Steelman, assistant to President Truman, and OTC Director Philip Fleming had assured railway equipment builders that government influences will be used to procure enough steel to produce 10,000 freight cars monthly through 1947. However, Defense Transportation officials were none too optimistic over prospects for boosting car production.

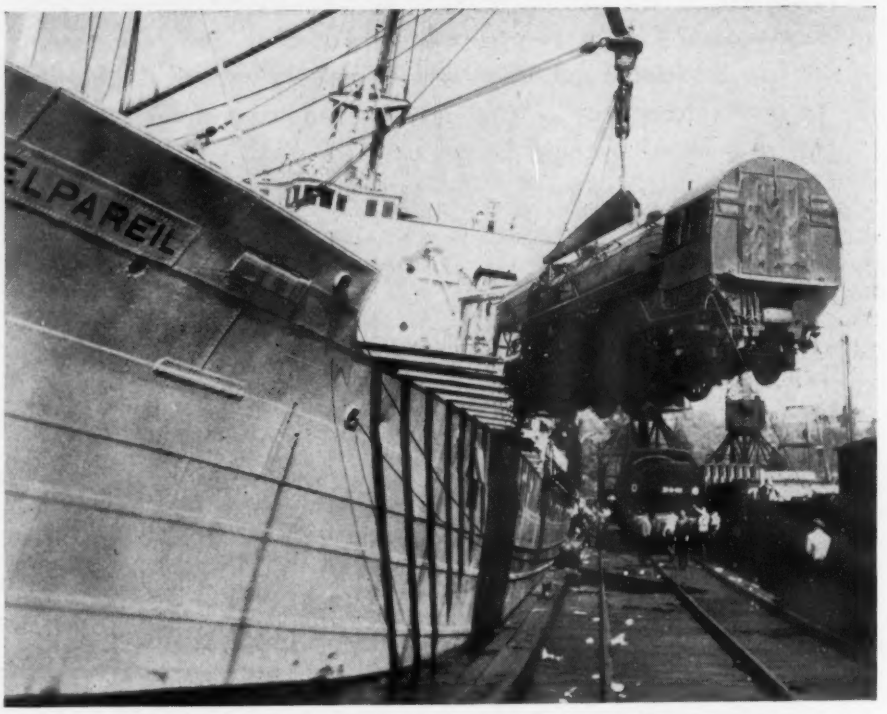
With serious car shortages threatened, the Office of Temporary Controls has moved to give precedence to domestic car requirements over those for export car production.

Recently it issued direction 18 to steel preference order M-21 which provides that no freight car builder shall place any order for steel to be used in production of freight cars for export, on orders received after Nov. 30, unless such builder has a written authorization. Export orders are defined as orders for delivery outside the United States, its territories or possessions, or Canada.

4 Per Cent Awaited Repairs

Freight cars awaiting repairs totaled approximately 67,294 units on Nov. 1, approximately 4 per cent of all cars available for service, OTC said. This represents net reduction of 15,514 "bad order" cars or approximately 18 per cent of the backlog existing in July, 1946. On that date CPA started expediting deliveries of steel to car repair shops.

While this reduction in bad order cars was encouraging, OTC said, production of new freight cars has not progressed as rapidly as anticipated. This lag occurred primarily because the car builders had scheduled export orders when domestic demand had not yet appeared in full force. Rescheduling of operations in the midst of production would have resulted in inefficient operation of plants and financial losses, and would not have benefited the domestic program proportionately. OTC now reports the situation requires that domestic production have precedence over all export needs.



New equipment for the war-damaged railroads of France and Belgium is loaded on the S. S. BELPAREIL at the Erie Railroad's pier at Weehawken, N. J. The ship carries 40 locomotives and tenders at a sailing

To what extent this move will increase the supply of steel for domestic cars is uncertain. However, all signs point to increasing pressure for new rolling stock with preliminary estimates indicating freight traffic in 1947 will be on about the same level as in 1946 which was about midway between the war peak attained in 1944, and the prewar peak of 1939. Freight ton miles were 14 per cent below 1945, and 20 per cent below 1944, but 31 per cent above 1929.

The railroads since late in the summer have been faced with an exceptionally heavy demand for freight cars, due in part to the change in the nature of the traffic offered since the end of the war and to changes in working conditions of industry. As a result the car supply, especially box cars, has been especially tight in recent months.

Although the level of freight cars on order has been expanding in recent months, the total is under requirements. As of Dec. 1, freight cars on order with builders and railway shops totaled 69,294 compared with 65,700 at the beginning of November. During November freight car deliveries amounted to 3244 against 3828 in October. During 1946, the roads installed approximately 40,000 new freight cars.

Railroad executives estimate that on the basis of potential traffic the roads will need a minimum of 350,000 new freight cars in the next five years just to take care of replacements. In addition, it is said there will be required a minimum of 100,000 cars in the 5-year period to make up the deficit which resulted from the lag in freight car building during the war years.

Discussing the situation recently, S. M. Felton, president, American Railway Car Institute, pointed out that a third of a million of the nation's freight cars are more than 30 years old; another quarter of a million, 26 to 30, and though some have been rebuilt, there is a limit to the life of a car after rebuilding. Replacement as quickly as possible is a "must" for very large numbers, probably hundreds of thousands, he said.

"Our industry," said Mr. Felton, "was unable to shift from war work to car building at the rate actually needed during 1946 for three chief reasons: Shortage of steel and other items, strikes in suppliers' plants and delay in placing car orders. Because they were caught between prewar rates and postwar costs, the railroads were placing orders at the average rate of only about 2500 a month with the car building industry during the first six months.

"The belated ICC decision granting

freight rate advances should release many programs previously held in abeyance for retirement of older cars by many railroads. In the interest of the railroads, and the industries they serve—actually as a part of the assembly line, linking "parts" with "final assembly"—our industry should reach full capacity, 14,000 cars monthly, as quickly as possible."

In addition to cars the railroads also are in need of motive power. According to R. B. McColl, president, American Locomotive Co., there is no question the roads need new motive power and other equipment to replace much over-aged rolling stock, which, in many cases, did double duty during the war years.

After V-J Day, he said, the railroads proceeded with modified equipment purchases but the ICC's approval of freight rate increases, effective Jan. 1, now gives them the needed resources to go ahead with broader equipment programs.

Heavy trend to diesel-electric locomotives is reported by Mr. McColl, a point borne out in a statement by R. V. Fletcher, president, Association of American Railroads. Mr. Fletcher said that ownership of steam locomotives in 1946 reached its lowest point since 1900, while ownership of diesel locomotives continued the upward trend of recent years. The number of steam locomotives owned on Nov. 30 last was 1199 less than on Dec. 31, 1945, but the number of diesel and electric locomotives owned increased by 405. The roads installed 82 new steam locomotives in the first 11 months of 1946, contrasted with 398 electrics and diesels. On Dec. 1, they had 564 new locomotives on order, of which 65 were steam and 499 electrics and diesels.

Despite this trend to electrics and diesels, Mr. McColl said he was of the opinion that higher freight rates should materially brighten the market outlook for steam locomotives which are preferred by the coal carrying roads.

Carloadings To Increase In Pacific Northwest

SEATTLE

Pacific Northwest Shippers' Advisory Board, at the quarterly meeting at Aberdeen, Wash., was told that a 15 per cent increase in carloadings may be expected in the first quarter 1947. The estimate is for 230,188 cars compared with 198,986 cars in the corresponding quarter 1946. Lumber and lumber products are expected to account for the bulk of the increase, these items estimated to increase 20 per cent in the coming quarter with 132,561 carloads. Grain and fruit shipments will be heavy. Coal and coal products are expected to register the only marked decline.

Huge Demand for Antifriction Ball and Roller Bearings Seen

Use in many types of productive machinery more than trebled in recent years due to need for higher speeds, greater strength and accuracy. Huge backlog of unfilled orders for consumer goods assures active 1947 market

Peacetime reorganization of industrial plant machinery and a vast backlog of unfilled orders for consumer goods in 1947 will create one of the greatest demands in history for antifriction ball and roller bearings, according to H. O. Smith, secretary of the Antifriction Bearing Manufacturers Association.

In many types of productive machinery, the number of antifriction bearings has trebled or quadrupled to meet the need for higher speeds and greater strength and accuracy, Mr. Smith said.

Many industries which in 1940 were moderate bearing consumers are now major markets and are absorbing a greater share of the ball and roller bearing output. Typical of such industries are textiles, earth moving equipment, machine tools, farm equipment and railroads.

With the automotive builders, these industries alone accounted for a major share of the $220 million in antifriction bearing production in the past 12 months, it was pointed out. In the textile field, demand for new synthetic fabrics and greater output of all textiles is forcing a general changeover to higher speed ball and roller bearing equipped machinery in hundreds of plants for the first time.

In 1940, with the exception of crack luxury trains, most railway passenger cars and virtually all freight cars, rolled on plain friction type bearings. Today, approximately 3000 new passenger cars on order are being equipped with roller bearing journals to provide smoother riding and to eliminate hot box delays. In addition, antifriction bearings are being installed on large numbers of express freight cars for the first time.

Added to these expanded applications, there is increased demand for additional ball and roller bearings in farm machinery, household appliances, electrical and power equipment.

War Surplus Bearings To Be Offered on Bid Basis

A $24 million inventory of war-surplus bearings of various sizes and types will be offered for sale on a bid basis, War Assets Administration announced last week. The inventory includes about 30-million pieces covering a range of sizes suitable for use in small instruments or heavy industrial equipment. The bearings are ball, roller and sleeve types, as well as special automotive types.

Heretofore sold at fixed prices, bearings worth $8 million already have been channeled to private industry by WAA. Regional offices will put the new bid program into operation at once in an intensive sales campaign.

Top Priority to Schools Continues on War Surplus

Government-owned surplus machine tools, classroom and laboratory equipment as well as cafeteria, kitchen and dining room equipment will continue to be sold at top priority and at a 95 per cent discount to schools and colleges training veterans under the G.I. Bill of Rights up to March 31, the Civilian Production Administration, War Assets Administration and Federal Works Agency announced jointly last week.

Aircraft Plant Leased by General Motors at Chicago

General Motors Corp., Detroit, has leased the aircraft plant at 900 E. 103rd St., Chicago, operated during the war by Pullman-Standard Car Mfg. Co., according to the War Assets Administration. Rental is $277,700.60, with the lessee paying taxes, maintenance and insurance. Lease runs to Dec. 15, 1951, with options for a further period of five years on a year-to-year basis, subject to certain mutual rights of cancellation.

There are three parcels of land, two of which, amounting to 35 acres, are owned by the government. Third parcel of about 35 acres is the property of Pullman-Standard company, and is being leased by the government for sublease to General Motors.

Five main buildings and several accessory buildings are included in the lease. Of the 800,000 square foot floor area, General Motors officials state that 700,000 square feet will be used by its Electro-Motive Division, LaGrange, Ill., for manufacturing parts and subassemblies.

Steel Production in 1946 Tops That in Any Year Prior to 1940

Output outstanding in view of strikes which hampered operations in six months of year, states Walter S. Tower, president, American Iron & Steel Institute. Supply-demand balance seen in 1947 if strikes are avoided

MAJOR strikes interfered with steel operations in six months of 1946, but the nation's steel mills succeeded in producing about 65,800,000 net tons of steel during the year, states Walter S. Tower, president, American Iron & Steel Institute, in a yearend statement.

"That amount of ingots and steel for castings exceeded the output of any year prior to 1940, in which year war influences were strongly at work," he said. "If it had not been for the national steel strike and two coal miners' strikes, the industry doubtless would have produced more than 80 million tons of steel, and would have operated at close to 90 per cent of its annual capacity.

"If 1947 witnesses another series of major strikes, then shortages of steel will be prolonged despite the best efforts of the industry. But, if operations are strike-free, enough steel can be turned out to restore within a few months a balance between supply and demand for steel. Consuming industries have the benefit of an annual steel capacity of nearly 92 million tons, that is some 6,700,000 tons larger than in 1941, when many production peaks in the manufacture of consumer goods were established despite heavy shipments of steel for armament purposes.

Facilities To Be Expanded

"Members of the steel industry are expecting to spend millions of dollars in 1947 to expand and improve their finishing mill facilities. In 1946, some $327 million was earmarked for this purpose by steel companies. An important part of this program will be the enlargement of the industry's facilities to turn out sheet and strip, two products widely used in the manufacture of consumer durable goods. In 1946, the industry's sheet and strip steel finishing capacity was 1 million tons larger than in 1941, and 2,500,000 tons in further additions were planned to come into operation in 1947.

"The 1946 production of steel ingots and castings, at about 65,800,000 net tons, was almost 14 million tons below the 79,701,648 net tons produced in the preceding year. Steel mill operations in 1946 were at an average of 71.6 per cent of capacity during the year, compared with 83.5 per cent in 1945. However, 1946 operations rose and fell sharply as efforts to push steel production to top levels were hampered by repeated strikes, with the high for the year, 91.4 per cent of capacity operations, established in the week of Nov. 18, and the low, 5.1 per cent, established in the week of Jan. 21 during the industrywide steel strike.

"Steelworkers lost many millions of dollars in pay during 1946, as a result of the steel strike and the two coal miners' strikes. Thus, total industry pay-

WALTER S. TOWER

rolls came to approximately $1,500,000,000 for 1946, down 9 per cent from the 1945 total of $1,645,332,700, although the average hourly rate paid to steelworkers in 1946 was an all time record high. The monthly rate in September for steel mill workers was at the average of 136.2 cents per hour.

The pay increase granted in early 1946 to steel mill workers, 18.5 cents an hour, was only one of a number of boosts in operating costs during the year. In addition, prices of iron ore, coke, fuel oil, and equipment and machinery are higher, and railroad freight rates have been increased substantially since July 1, 1946. Railroad freight costs are a considerable factor in steel operations, due to the enormous amounts of raw materials that must be brought to the steel mills to permit operations. For example, in 1945, the steel industry had to bring in to steel plants more than 91 million tons of iron ore, 84 million tons of coal, 17 million tons of purchased scrap, and almost 6 million tons of fluxes.

To offset increased costs facing the steel industry early in 1946, the Office of Price Administration granted it a price increase which was estimated by the OPA to average $5 a ton, and was regarded as inadequate by members of the industry, in view of the many items of increased cost since ceiling prices were established.

Olds Says Huge Demand for Steel Remains Unsatisfied

The American steel industry did its utmost during 1946 to produce the maximum amount of steel so that our national economy might promptly be reconverted to peacetime production, and so that adequate amounts of steel might be made available for housing, automobiles and the many other goods which the people of this nation had willingly done without during the war years, states Irving S. Olds, chairman, U. S. Steel Corp., in a yearend statement.

"Because of the steel strike at the beginning of the year and effects of the disastrous coal strikes in the spring and late fall, the steel industry lost one-fifth of its expected production for 1946. This loss amounted to around 16 million tons of ingots," he said.

"A new year has dawned. The demand for steel and other products is still great. The opportunity for a sustained period of general national prosperity seems promising. I sincerely hope that unnecessary strikes or faulty economics will not stand in the way of a realization by the American people during 1947 of the benefits to be obtained from full, continuous and efficient production in all fields of business activity."

Nickel Shipments in 1946 Approximate 1945

World deliveries of Canadian nickel in all forms in 1946 will compare favorably with those of 1945, despite reconversion conditions and labor difficulties, says Robert C. Stanley, chairman and president, the International Nickel Co. of Canada Ltd.

"In line with improvement noted in the general industrial situation," he continued, "nickel operations have increased appreciably during the last half of the year. Operations are now running at about 75 per cent of capacity.

"On Nov. 25 International Nickel's United States subsidiary increased its

United States prices for nickel, bringing them into line with those prevailing in the world market.

"The steel industry continued to be the largest consumer of nickel during the year. It is estimated that over half of the nickel consumed by the steel industry in 1946 was used in the stainless steels. Inquiries for stainless steels from peacetime industry continued to expand and indications are that in 1946, despite interruptions in steel operations, stainless steel production will approximate that for 1945, when a new high record was established. Of the wrought stainless steels produced, the chromium-nickel types comprised more than two-thirds of the total. This was substantially higher than any peacetime year.

"Current broad interest points to increasing markets for stainless steels in the industrial equipment field.

"The three-way or triple alloy steels containing nickel, chromium and molybdenum which came into prominence during the war have left their mark on current peacetime production. Their tonnages still represent the largest of any single class of engineering alloy steels. Of the prewar standard steels the nickel-molybdenum types for case hardened parts which were restricted in use for part of the war have returned to an enlarged peacetime application.

"This past year also has seen an appreciable expansion in tonnage of those low alloy high strength steels, containing small amounts of nickel, for flat products and light structural shapes employed in the construction of railroad cars, automotive truck bodies, power shovels and similar types of equipment where weight saving is important."

£41 Million Steel Combine Planned in South Wales

Although plans are progressing for the British government to nationalize the steel industry (STEEL, Dec. 16, p. 70), a large steel combine is being established at Port Talbot and elsewhere in South Wales. The combine, which is unofficially reported to be capitalized at £41 million, plans to erect a hot-strip mill at Port Talbot and two cold-reduction plants at other South Wales locations.

The hot-strip mill, which is projected by Richard Thomas & Baldwins Ltd., will contain a quantity of machinery imported from the United States. In the event the steel industry is nationalized, it appears likely negotiations to supply the machinery and equipment will take place between American manufacturers and the British government.

Westinghouse Loses $50 Million On Record Peacetime Production

Cost of manufacturing and selling products in last six months averaged 111 per cent of selling price. Advances in labor rates held largely responsible. Backlog of orders going into 1947 is largest in company's peacetime history

A STAGGERING operating loss of more than $50 million was incurred by Westinghouse Electric Corp., Pittsburgh, in the first full year of peace. The loss, which was 2½ times as great as the total losses incurred during the three worst depression years, was incurred in spite of the fact that the company's dollar volume of production was the greatest in any peacetime year, according to Gwilym A. Price, president.

The operating loss was offset by the recovery provisions of the wartime tax law, protecting the company against a crippling blow to its financial strength

GWILYM A. PRICE

and the job security of its 96,000 employees. But even after giving effect to the tax carry-back, the company's net income on $254,338,189 of sales in the first 11 months was only $4,411,481.

"Westinghouse cannot look to tax carry-backs to protect it against losses in 1947," says Mr. Price. "No tax law can assure wages or profits; only the ability to make a good product and sell it competitively can do that.

"On the brighter side, Westinghouse approaches the end of 1946 with $573,069,453 of orders on its books. This is the greatest backlog in the peacetime history of the company. The production of this volume of goods ordinarily would assure our employees steady work and would return to the company a fair profit. These are, however, not ordinary times.

"Industry's ability to produce has not matched the demand for its products. Long costly strikes, shortages of critical materials due in large part to unrealistic and inadequate pricing policies under government controls have lowered some industries' production levels below capacity.

"Some of these abnormal conditions are still with us. In durable goods industries at least they promise to continue well into 1947. Costs have risen so steeply that the overall cost of manufacturing and selling our products in the last six months averaged 111 per cent of the prices at which we sold them. That means we had to spend $1.11 to produce and market a product for which we received $1.

"The cost of labor, with its resulting effect on the cost of materials, is largely responsible for setting the price at which a company must sell its products to stay in business. Labor costs represent at least 85 per cent of the total cost of production and distribution in the United States, if the total step by step process—from farm or mine to the final consumer—is taken into account.

"OPA price controls have been lifted. However, freedom to raise prices does not of itself assure prosperity either for companies or their employees.

"To sum up, Westinghouse has made substantial progress during 1946 in its $132 million postwar expansion and reconversion program. We now have more business than ever before in peacetime; we have the increased facilities to set new production records if material scarcities are overcome; and we have more than 96,000 employees to do the job. For the nation and Westinghouse 1947 can be the best of all our years."

France Places $35 Million Ship Contracts in Canada

Contracts aggregating approximately $35,725,000 have been placed by the French government with six Canadian shipbuilding companies, according to W. D. Low, managing director of the government-sponsored Canadian Commercial Corp. The contracts involve 13 cargo vessels and 140 barges, most of which are to be delivered by the close of navigation in 1947.

Price Spread Between Hot and Cold Finished Bars Shows Little Change

Increases in base prices plus extensive revisions in extra cards leave price differentials generally unchanged. Principal changes in cold-finished bars include new extras for quantity, size, cutting, boxing and quality

COLD-FINISHED carbon bar producers have advanced prices $2 per ton to a price base of $3.20 per 100 pounds and issued a new extra card, principal changes in which are: New extras for size, quantity, cutting, boxing and bundling, chemical requirements and quality.

The price spread between hot and cold-finished bars remains generally unchanged despite basic changes in extra cards for both.

There is now a standard quality extra for cold-finished carbon bars of $3 per ton, for cold-finishing requires special quality hot-rolled bars which also take a $3 extra. Cold-finishers formerly absorbed this basic quality extra. The chemical requirement and quality extras are the same as those appearing on the hot-rolled carbon steel bar extra list. Quality classifications and tolerance details referred to in the new extra list for cold-finished carbon bars and shafting will be included in an early revision of section No. 9 of the AISI Steel Products manual.

Size extras for cold-finished carbon steel rounds for sizes under ⅛-in. now are available only on application and revision in range classifications has been made. Formerly in range over 3/32 to less than ⅛-in. the size extra for rounds was $2.50 per 100 pounds; while 3/32-in. and under was $3. For ⅛ to under 3/16-in. the size extra is now $4, against $1.30; 3/16 to under ¼-in., $2.75 against $1.10. As in carbon steel bars, the sharpest increase in size extras has been made among the smaller sizes. Special extras for sulphur are applicable for sizes under ⅜-in.

Hexagonals and Squares Revised

Size extras for cold-finished hexagons less than ⅛-in. are also available only on application, and for squares less than 3/16-in. For ⅛-in. to less than 3/16 in., the new size extra for hexagons is $7.50, against former extra of $5 per 100 pounds; for squares 3/16 to less than ¼-in., $4.25 compared with $4. As in case of cold-finished rounds, the biggest increases in size extras for hexagons and squares occur in the smaller size ranges.

In the revised size extra card for cold-finished flats a new width classification range for over 3-in. has been adopted. The former card grouped size extras for over 3-in. wide under one heading; now there is a classification over 3 to 6-in. inclusive, and another column for wider than 6-in. In the width ranges 5/16-in. and wider and thickness ranges ⅜-in. and thicker, increases in size extras for cold-finished flats are noted up to 20 cents per 100 pounds.

There is now a quantity extra of 5 cents per 100 pounds within range of 20,000 to 39,999 pounds which formerly was base. No charge is made for 40,000 pounds and over; formerly there was a deduction of 5 cents per 100 pounds. For less than 300 pounds the new quantity extra is $4 per 100 pounds, against $3; 300 to 499 pounds, $3 compared with $2.25. For under 20,000 pounds, the average increase for all range classifications is about 33 cents per 100 pounds.

Extras for cutting to exact lengths have been increased to as much as $1 per 100 pounds, and length range classifications revised. Formerly there was no extra for cutting rounds, squares and hexagons or flats up to 6-in. wide within length range of 120 to 288-in. inclusive; 30 cents per 100 pounds is now charged for flats up to 6-in. wide and 15 cents for the other bar classifications. However, this specified length extra will not apply if a 24-in. leeway in random lengths is permitted.

The maximum of the range for carbon, manganese, phosphorus, sulphur and silicon shall determine the chemical requirement extras. When the purchaser specifies a range greater than standard, the highest standard range within the greater permissible range shall determine the extra and govern the manufacture of the steel. These extras closely follow the hot-rolled carbon bar chemical requirement extras.

When silicon over 0.10 per cent maximum or in any standard range up to 0.60 per cent maximum or killed steel is specified or implied, the standard quality extra of 15 cents per 100 pounds is not applicable. Additional restrictive requirements for cold-finished bar extras are 50 cents per 100 pounds for non-killed steel and 25 cents for killed steel, and are in addition to all chemical requirement extras. Where added restrictive quality is applicable on either non-killed or killed steel, the extra for standard quality does not apply.

Extras for chemical and physical test-

(*Please turn to Page* 138)

Changes in Hot-Rolled Alloy Bar Extras Follow Pattern of Hot-Rolled Carbon Bars

HOT-ROLLED alloy bar producers, in raising the price base from $2.921 to $3.05 per 100 pounds and dropping the 8.2 per cent increase pattern on both base price and extras granted under OPA, have also revised the alloy bar extra card along lines adopted by hot-rolled carbon and cold-finished bar interests.

There have been decreases and increases established in alloy differentials for standard grades to bring them more in line with present operating costs. Increased costs of nickel and the ferroalloy products are major factors behind revision in many of the alloy differentials. There is no consistent relationship of present alloy differentials with former extra schedules for alloying content as apparently each grade represents an individual price structure.

Size extras for hot-rolled alloy rounds, squares, round cornered squares and gothics have been sharply increased in the smaller sizes and the range of sizes revised. In size range 1/4-in. down to 7/32-in., for example, they have been increased 50 cents per 100 pounds. As in carbon bars there is now no base range in the size extras; under former schedule, the base size range was 47/64 to 1½-in., for which 20 cents per 100 pounds is now charged. The size extra for 1/4 to 5/16-in. for hexagons is now $2, compared with former extra of $1.50 per 100 pounds for 1/4-inch. For both bar classifications, the extent of the increases in size extras narrows for the larger size ranges.

The size extra card for bar flats, other than spring steel, also has been completely revised in respect to ranges of widths and thickness. The thickness classification formerly ranged from 4 in. down to 1/4-in., but is now carried further to under 1/4-in. to 13/64-in. inclusive. The width ranges now start at 1/4-in. to under 5/16-in. Formerly there was no extra charged for widths 1 to 12 in., in thickness range from 1 to 3/8-in., but under new schedule there is no base range with extras of 25 up to 50 cents per 100 pounds applying for

the former base width and thickness ranges.

Treatment and finish extras for hot-rolled alloy bars do not include machine straightening. These extras will be added when specified or required, otherwise no straightness tolerances will be guaranteed on products requiring annealing, normalizing, or quench and draw heat treating. Pickling extra for rounds, squares and hexagons is now 25 cents per 100 pounds; bar flats under 1½-in. wide, 40 cents, and 1½-in. wide and over, 30 cents. For annealing the extra is 90 cents, and normalizing (stress relieving after cold working) 75 cents per 100 pounds. All treatment and finish extras are applicable only to acceptable sizes, lengths and grades.

Close tolerance extra, primarily applicable on automotive coil spring stock, has been increased from 70 cents to $1 per 100 pounds.

Quantity extras for finished alloy bars, bar-strip and spring flats have been increased 5 cents to 20 cents per 100 pounds in range 5 to 3 net tons, inclusive, from 20 to 30 cents in range under 3 to 2 net tons, inclusive, and from 35 to 75 cents under 2 to 1 net ton, inclusive. The base of 20 net tons and over is unchanged, as also are the other tonnage ranges.

Centerless grinding extras for coil spring stock only have been increased 20 cents per 100 pounds for under 11/16-in., to and including 7/16-in., and 15 cents for 11/16-in. up to and including 1½-in.

Cutting Extras Revised

Extra card for length and cutting extras has been completely revised, incorporating a revision in length ranges and the establishment of the following separate classifications: Specified length extras; and, under general heading of cutting extras, there are columns for hot shearing, hot sawing, abrasive, machine or torch cutting for both ends and one end only, and cracker cutting. Increases in cracker cutting extras range from 10 cents up to 50 cents per 100 pounds, and new size range of over 3 to 4 in., inclusive, with an extra of 55 cents added.

Chamfering extras, for automatic screw machine use only, on rounds, hexagons and squares have been increased up to 60 cents per 100 pounds in size range from under 11/16-in. to 3/16-in., with lesser advances noted in larger sizes.

Increases also have been established in machine-straightening extras.

The revised hot-rolled alloy extra card also includes a new table of extras for color marking of rounds, squares, hexagons or flats.

Producers Make Major Revisions In Hot-Rolled Carbon Bar Extras

Recent increase of $2 a ton in base price accompanied by adjustments in list of extras covering sizes, cutting, straightening, treatment and finish, quality, packaging and loading, chemical requirements. Quantity extras hold unchanged

NEW PRICE structure for hot-rolled carbon steel bars shows in addition to the $2 per ton increase in price base to $2.60 per 100 pounds the following major revisions in extras:

There is no longer a base size range, and range classifications have been revised in the size extra card for rounds, squares, round cornered squares and gothics. In the old size extra list there was a base range of 47/64 to 1½-in. taking no extra, while an extra of 15 cents per 100 pounds or $3 a ton is now charged within the size range of 47/64 to 2½-in. For the smaller size ranges down to ¼-in. increases in size extras from 5 to 20 cents per 100 pounds have been established; for sizes over 2½-in. the size extras remain unchanged.

Similar adjustments in smaller size ranges have been made in size extra lists for ovals, solid half rounds, equal and unequal leg angles, channels and tees, with advances up to 40 cents per 100 pounds noted.

A size extra of 15 cents per 100 pounds is now charged for square and round edge and concave flats within the width and thickness ranges formerly considered base. In the larger widths outside the former base range the size extras are unchanged with but few exceptions. In the narrower widths, advances up to 15 cents per 100 pounds are noted. The revised extra card for flats also establishes new extras for widths below ⅜-in.

No revisions have been made in quantity extras.

Cutting extras are completely revised and it will be noted dead lengths in any length will involve an extra. Extras for standard cutting will not be charged provided the buyer will accept all in random lengths, or all in multiples of not over 5 ft, or 10 per cent random shorts with no lengths more restricted than the minimum leeways. The new cutting extras have been established on basis of: (1) Standard cutting to specified lengths; (2) special cutting, one or both ends; (3) precision cutting, one or both ends, with qualifications.

Straightening extras have been grouped under one heading, "All Bars and Bar Shapes," in contrast to former card which listed separate extras for rounds and squares, hexagons and octagons and flats. These extras are on basis of pound per foot, while the old schedule with the exception of flats was based on dimensions in inches. Increase of 5 to 10 cents per 100 pounds generally has been established for straightening extras.

Treatment and finish extras, applicable only to acceptable sizes, lengths and grades, no longer include machine straightening for box or pipe annealing and heat treating. Pickling extras have been placed on a pounds per ft basis and new range of sizes established.

There is now a special hot-rolled carbon bar quality extra of 15 cents per 100 pounds, which does not apply on killed steels. Additional "restrictive requirement" extras are 25 cents per 100 pounds for killed steels and 50 cents on non-killed steels with the extra on the latter including the special bar quality extra.

Non-standard Steels Changed

For non-standard steel specifications there is an extra of 10 cents per 100 pounds. A chemical composition specification is classified as non-standard when it deviates from the composition of any one of the standard steels designated by a grade number in AISI manual No. 8 covering hot-rolled carbon steel bars. A mechanical property specification is non-standard when it deviates from the list of standard specifications subject to mechanical tests as explained in same manual. When a chemical composition is specified encompassing the chemical ranges of any one of the designated standard steel specifications with a greater range for one or more elements, the extra does not apply.

Chemical requirement extras have been advanced up to 15 cents per 100 pounds, particularly for sulphur and manganese.

The new extra card shows packaging and loading extras with special charges noted for bundling, wrapping and boxing, blocking and loading. There is a charge of 15 cents per 100 pounds for bundle weights under 2000 to 500 pounds; under 500 pounds, 25 cents. For special blocking, $10 per car is charged; 5 cents per 100 pounds for box and flat car loading.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Extent to which first report of the Council of Economic Advisers will be leaned upon by President Truman in making recommendations to the new Congress uncertain. Republican leadership appears mildly critical of the Council's views

PRESIDENT TRUMAN in a press conference immediately following issuance of the first annual report of the new Council of Economic Advisers refused to make any commitments to newsmen as to the extent to which the contents of this report would influence the economic report which he is scheduled to deliver to the new Congress shortly after it convenes.

But he indicated that he did not go along entirely with the report. He said he did not agree with the suggestion that there may be a dip in the business curve next year and he thought the outlook is good and will continue good if we can just get people to stay at work.

He then added significantly that nobody wants any strikes and he did not think any of the recent strikes were necessary.

In general the Republican leadership of the 80th Congress was mild in criticizing the report and this may have been due to the flat statement of Messrs. Nourse, Clark and Keyserling that they construed the Employment Act of 1946 as "a mandate laid on the President and the whole executive establishment and upon both houses of Congress to pursue the goal of promoting maximum productive use of the nation's resources, natural and human, thereby providing work opportunities as ample as are practicably possible for those who are anxious to apply their labor to the supplying of their wants."

Republican Comments Favorable

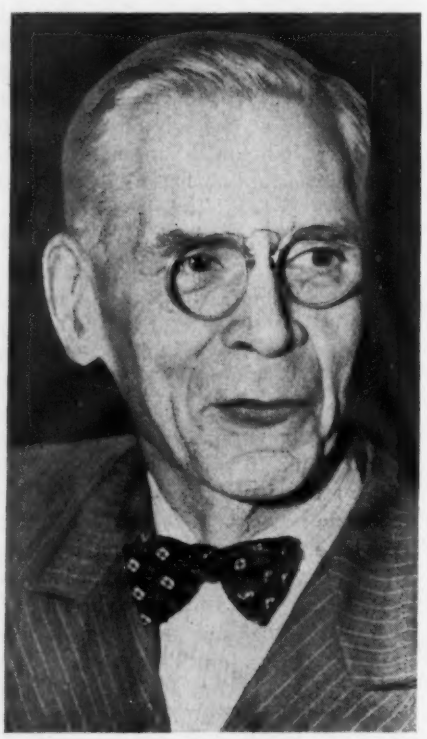
Because the report generally was written on the basis of this concept many of the Republican comments have been favorable. Senator Taft's only criticism was that the report should have laid greater stress "on the tremendous responsibility resting on business to keep its prices down and on labor to refrain from unreasonable demands for increased wage rates."

Other Republicans who exercise less leadership than Taft thought the key to whether we would have good or bad business next year depends on how well we minimize production lapses resulting from labor management trouble. Senators Bushfield (South Dakota) and Hickenlooper (Iowa) voiced the attitude of an increasing number of congressmen that industrial disputes will not abate until Congress makes long overdue reforms in the labor laws. It seems likely that revision on labor laws may be the principal approach of Congress in striving to provide the basis for continued prosperity. In fact the early Republican disposition to proceed cautiously on labor legislation has been replaced by a bolder attitude and it now seems likely that labor law reform will rank equally important with reducing government expenses, lowering the national debt and reducing taxes, as well as elimination or modification of several hundred government controls that are considered stifling to business enterprise.

German Scientists Utilized

The American metal industry stands to gain much from perfection of heavy duty equipment of German design for fabricating light metals, the War Department claims, in officially confirming the presence of several hundred German and Austrian scientists and technical personnel in this country for aiding in research and development work.

American study of German-type hydraulic presses, rolling mills for cold-rolling metal and double-action hammers, said the War Department, will serve as the basis for a text "highly desired by industries and universities of the United States."



EDWIN G. NOURSE

Argentina-Spain Trade Pact

Terms of the recently concluded trade agreement between Spain and Argentina reveal that Spain will furnish quantities of metals to Argentina, according to a summary just released by the Department of Commerce.

Included in Argentina's projected purchases from Spain between January, 1947, and December, 1951, it is stated, will be 15,000 tons of pig iron, 5000 tons of sheet iron, and 5000 tons of lead, all representing minimum quantities which Argentina undertakes to buy.

A similar report on the recently-concluded Swedish-Soviet pact was also issued, and shows that during the first year of its operation (1947) Swedish delivery quotas will include various types of high-quality steel and steel products, drilling pipes, drilling steel, steam boiler tubes, ball and roller bearings, also materials for manufacture of ball bearings, spare parts for turbine generators, various optical and measuring instruments.

The USSR will ship to Sweden various raw materials, including chrome and manganese ores, nickel, silver, platinum, some pig iron and rolling mill products which Sweden will incorporate in some of the equipment to be delivered to Russia.

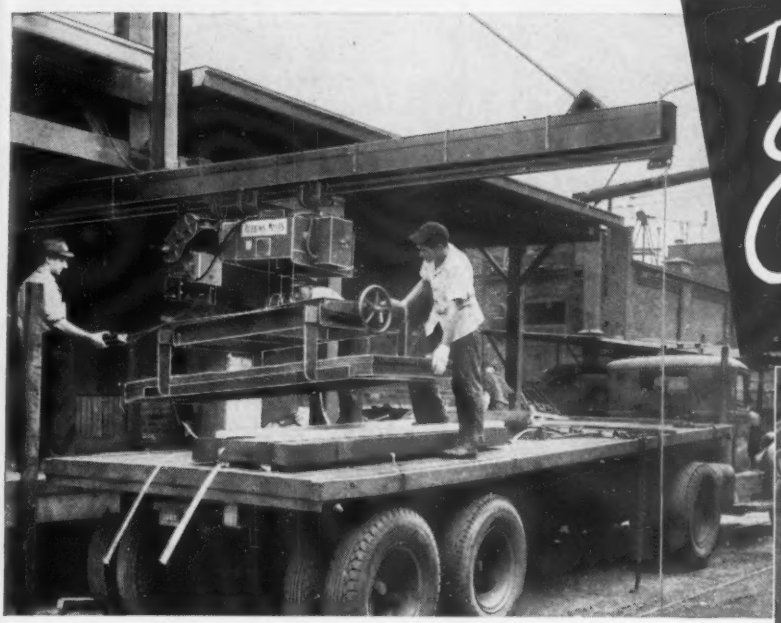
Ounce of Prevention

Although very little publicity attaches to some of their important moves, the Army and Navy currently are taking many actions designed to prevent this country from being caught on the short end in any future attack of the Pearl Harbor sneak variety. Some of the steps being taken admittedly are premature in the light of currently existing knowledge. The idea is that the only safe course is to begin at the earliest possible moment laying the groundwork for meeting future contingencies of any type.

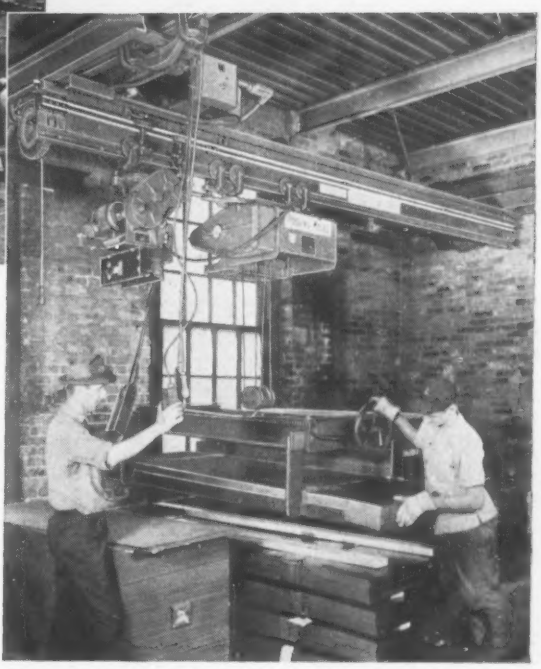
An example is the organization of special groups by both the Army and Navy to work out special measures to defend the United States against any sudden outbreak of atomic warfare. The Navy has put up to Rear Admiral William S. Parsons the assignment of perfecting atomic defense plans. Admiral Parsons figured as one of the key Navy men in

HANDLING STEEL

The Easy Way!

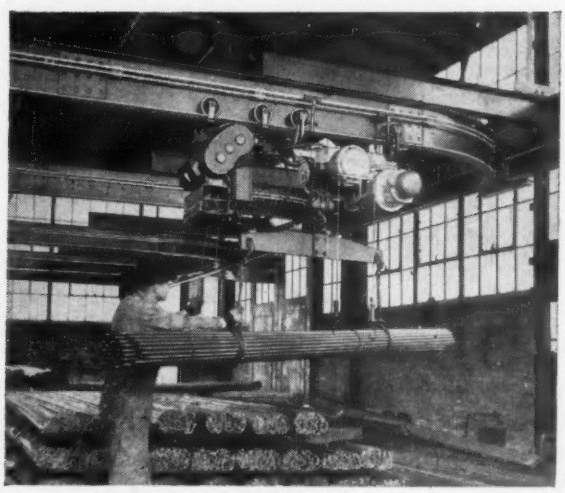


Power operated unit unloads steel by pushbutton control



Electric hoist with special hook, handles coils to process.

Power crane accurately spots 2-ton loads.



MonoTractor and 3-Ton hoist moves bar stock.

This tough job is made easy from start to finish —unloading stock from truck, to storage, to machines, to shipping—American MonoRail Systems, to fit any budget, afford faster handling, accurate spotting, reduced fatigue, added safety and greatly reduced damage.

American MonoRail Equipment saves one company $20 on every truck unloaded; another saved $150 in the first four months. With thousands of installations to draw from, American MonoRail Engineers are well qualified to offer solutions involving overhead handling equipment. This service is offered without obligation.

THE AMERICAN MONORAIL COMPANY

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the recent atomic tests at Bikini Atoll. The War Department has set up a special board to work up defenses against all the newer types of attacks—atom bombs, guided missiles, and biological warfare.

The War Department board also is in good hands. Its chairman is Maj. Gen. Harold R. Bull, who, among other important assignments, served as chief of operations for General Eisenhower in the European theater. Other board members are Maj. Gen. Percy W. Clarkson, Maj. Gen. Robert W. Douglass, Maj. Gen. William H. Arnold, and Brig. Gen. Blackshear M. Bryan. Serving on the board's staff are Colonels Charles B. Daniel, Keith Barney, Hamilton A. Twitchell and William M. Creasy, and Lieutenant Colonels Innes Randolph and Lloyd R. Salisbury.

Producing New Type Steel

American steel manufacturers are now producing a steel, which it is claimed, can safely withstand working pressures up to 1200 pounds per square inch at 900 degrees F based on discovery of German alloy steels used for similar purposes, according to the Office of Technical Services.

Searching out German technical secrets last year, American experts learned that German utility installations were beating the problem of graphitization caused by high pressures and temperatures in heavy-duty utilities, by using a chrome-molybdenum alloy steel in their high pressure equipment.

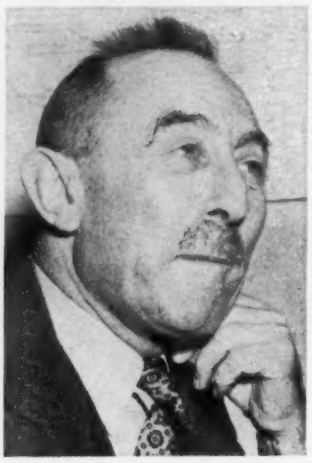
Samples of the German steel were shipped to this country for testing and analysis. Since then, it is stated, American manufacturers have begun production of a steel of similar properties.

General Minton in New Post

Brig. Gen. Hugh C. Minton who is given credit for having fathered, in cooperation with the American Iron & Steel Institute, the Army's original "steel plan," has joined the staff of the Army Ordnance Association, Washington. There he has the special assignment of co-ordinating the activities of the association's working committees. He is to operate under the supervision of Harvey C. Knowles, vice president of the association, and vice president, Proctor & Gamble Co., Cincinnati.

General Minton was executive officer of the Ordnance Department under General C. M. Wesson. During the early 1930s he had charge of the development of the Army's original plan for the utilization of the country's steel capacity in time of war. In this work he worked with representatives of all the steel companies and won much commendation from them for the effectiveness of his efforts. This plan, as subsequently modified, formed the basis of the mobilization of the steel industry for World War II. During that war, incidentally, General Minton served as chief of the important Pittsburgh Ordnance District.

The Army Ordnance Association Committees with which General Minton will work are industry committees concerned with problems relating to artillery, artillery ammunition, fire control instruments, gages, small arms, small arms ammunition—and an overall group headed by C. F. Kettering, vice president in charge of the General Motors Research Laboratories Division, and known as the Ordnance Research & Development Division.



CAMILLE GUTT

Managing director of the International Monetary Fund, M. Gutt discusses rates of exchange of member countries at a press conference in Washington

Plan "Skyhook Laboratory"

Aluminum has been selected as the material for constructing a balloon-supported gondola to be used by the Office of Naval Research for making studies of the atmosphere in the higher altitudes. This "skyhook laboratory," to carry a complete complement of instruments and scientific personnel to use them, will be hung from a "cluster" of balloons. There will be 100 of these balloons, each 57 feet in diameter.

The cluster idea was orginated by the famous Dr. Jean Piccard who made use of it in a successful stratospheric ascent in 1937. Now professor of aeronautical engineering at the University of Minnesota, Dr. Piccard has been given charge of all technical aspects of the equipment and its use. The construction contract has been placed with the General Mills Aeronautical Research Laboratory. The ascent is scheduled for mid-June, 1947, near Ottumwa, Iowa. Dr. Piccard believes a height of 100,000 feet will be attained, and that it will be possible to hold the gondola there for several hours while scientific data are compiled.

Naval Training on Lakes

In the next year or two the crews of iron ore and other vessels operating on the Great Lakes will see something new—naval training ships operated by both the Canadian and United States navies. The arrangement was decided on in international conferences which resulted in agreement that a program of training on the Great Lakes was desirable as a means of preparing to meet any future emergency requiring naval operations.

The agreement takes the form of an interpretation of the historic Rush-Bagot Agreement of 1817 regulating the presence of naval vessels upon the Great Lakes. Originally drafted as a means of settling problems arising from the war of 1812, the agreement since has become a symbol of the friendly relationship between Canada and the United States. Under the terms of the Rush-Bagot Agreement, as amended, the two governments will provide full information to each other as to the number, disposition, functions and armament of the training vessels to be used in the new program.

Getting Back to Normal

That conditions rapidly are reverting to normal in Washington again is demonstrated by the decision of the Chamber of Commerce of the United States to hold its next annual meeting in the capital city. The dates will be April 29 and 30 and May 1. This is the first time in five years that Washington hotels have given assurance they could handle the convention.

Post-Bikini Tests Still on

From present indications Navy contractors in the metalworking industry are unlikely to receive post-Bikini specifications for shipbuilding materials and for ship fittings and equipment much before the end of 1947, if then. The Navy has handed to Rear Admiral Thorvald A. Solberg, director of ship materiel Crossroads Section, Bureau of Ships, the job of analyzing what happened to materiel and equipment as a result of the atom bomb tests. It probably will require several months before Admiral Solberg and his staff of technicians reach basic conclusions, after which further studies will be assigned to other Navy personnel.

Limited Liability, Co-ordination With State Jobless Insurance Laws Necessary to Guarantee Programs

Government study stresses precautions necessary if annual wage plans are to survive depressions and keep costs within ability of employers to pay. Survey presents hypothetical cost figures for two "typical" steel companies from 1937 to 1941

MOST employers, even in industries such as steel that are subject to sharp cyclical fluctuations, can adopt and maintain guaranteed wage plans—provided they exercise two precautions.

The first is to keep their payments for idle time to a minimum by taking fullest advantage of the state unemployment compensation systems.

The second is to limit their liability in paying for idle time; the limit in all cases must be sufficiently low to safeguard the employer's solvency during periods of depression, but it also must be high enough to give to the employees assurance of a reasonable amount of income during such periods.

This is the thesis of a major portion of the interim report of the government's Guaranteed Wage Study Staff, recently released by its director, Murray W. Latimer. While Mr. Latimer recommends changes in a number of existing laws to encourage the wider adoption of guaranteed wage plans (see STEEL of Dec. 23, p. 37), his conclusion is that employers generally need not wait for legislative reforms to institute guaranteed wage plans. They can make a beginning now on a modified basis, and improve their systems later.

Report Analyzes Possibilities

To illustrate the methods of organizing guaranteed wage systems, the report carries an analysis of the possibilities at two "typical" steel plants. These attempts to show that if proper safeguards are set up to limit the employer's liabilities the employees can enjoy a high measure of income security, even in severe depression periods, and at a lower cost to the employer than has been widely believed.

The ideal arrangement, Mr. Latimer says, occurs when an employer guarantees full-time wages of all his employees for a full year of 52 weeks. But such an arrangement would wipe out most employers in the first bad depression. Hence most of the 196 plans now in operation in the United States are subject to limitations of various kinds.

Some plans guarantee full-time pay for 48 weeks a year. Some guarantee only 90 or 80 per cent of full-time pay—for 52, 48, or any other specified number of weeks. Some plans cover employees after they have been on the plant payroll for 30 days, while others require periods of 90 days to two years before new employees become eligible to the guarantee. The report tells about some plans that have been dropped in the past because the guarantees were too liberal to stand up in a period of poor business. It relates of other instances where the original provisions, such as the number of weeks' pay guaranteed, the percentage of full-time pay guaranteed, and the period required for making new employees eligible, had to be liberalized in order to save the plans and the employers from collapse.

A study of 188 existing plans on which the Guaranteed Study Staff obtained detailed information, reveals they cover 68,645 employees in some 500 business and manufacturing establishments. In general, they fall into three categories—those that guarantee wages, those that guarantee hours of employment, and those under which wages are advanced when employment is not available. The first two types are by far the most popular.

In manufacturing, the plans are found principally in food and clothing establishments in which seasonal variations in production are much greater than in most other manufacturing, but in which year to year variations are smaller than in the capital goods industries.

Of the entire 196 existing plans, 100 cover all the workers in the establishment. In 59, all the workers are eligible immediately upon hiring or within 30 days thereafter. In addition, in 32 plans all employees except part-time workers and extras receive the benefits as soon as employed or within 30 days thereafter. In 51 plans the coverage is restricted to specific departments or occupations. In 20 of the plans more than one year's service is required before a new employee enjoys the guarantee. In general, the plans vary to fit conditions; some of them, for example, have comparatively narrow coverage in certain plants where it is the custom to cover the older and more efficient employees by individual contracts.

Of the 185 plans that provide for full weekly hours or pay, 127 provide for payment over the full 12 months; 15 provide for 11 to 12 months; 20 for 10 to 11 months; 19 for 6 to 10 months; 3 for less than 6 months; and 1 for an "indefinite" period. In addition, 11 provide for coverage at less than full weekly hours of pay.

Study Reveals Flexibility

"The study reveals flexibility in tailoring a guaranteed wage plan to the individual circumstances, such as stability of employment, financial resources, production problems, etc," says Mr. Latimer. "It also suggests the possibility of introducing guaranteed wage plans progressively, so that the clauses governing coverage, eligibility, and proportion of wages guaranteed can gradually be broadened as experience dictates."

The study reveals the guaranteed wage plans are not exclusively labor union programs; about one-third of the plans in existence cover workers not represented by unions. In some of the unionized plants the plan is not subject to collective bargaining but is within the exclusive province of management.

In general, the employer desiring to set up a guaranteed wage system must start out with an approximate idea of how much money it is going to cost him to maintain it. To devise a formula that will come within this cost expectation,

ON UNION AGENDAS

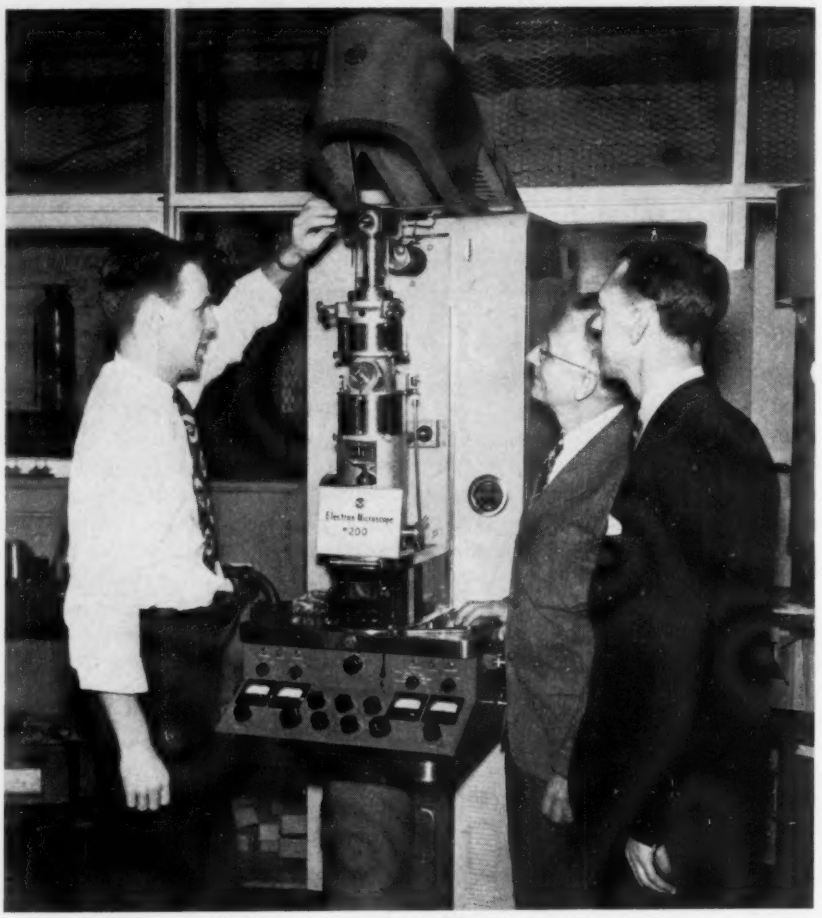
Demands for a guaranteed annual wage remain on the agendas of the major CIO unions, including the United Steelworkers of America. Relatively little emphasis was placed on this demand, however, at the recent wage and policy meetings in Pittsburgh. This leads many observers to believe the union will push the guaranteed annual wage demand just enough to draw public attention to it, and then will shelve it for the coming year in favor of wage increase, social insurance and portal-to-portal pay demands.

Only about one-half of 1 per cent of all wage earners currently are covered by annual wage plans, practically all of which were established on management's initiative.

he must consider these factors: The coverage, or the number of people eligible for payments under the plan; the number of weeks, or hours, or the proportion of a full year to be guaranteed; the percent of work or pay guaranteed per guaranteed unit of time-hours, weeks, months or a year; the extent to which overtime in one period may be used to offset obligations under the guarantee in another period; provisions under which the employee's eligibility, once acquired, may be terminated; and the ability of the employer to modify the plan, suspend it, or terminate it entirely.

Each of these points requires considerable study, not only from the point of view of management, but also that of the employee. For example, the length of time a new worker has to be on the payroll to qualify for the guarantee is important from the standpoint of limiting the liability of the management. It also is important from the labor standpoint; for instance, if there is a large group of workers who have not qualified, there could be a tendency during a depression to concentrate layoffs largely in the unguaranteed group.

Another important question is whether to apply a guaranteed wage system throughout a plant, or to one or two departments. In some plants the employees in certain key departments have an all-round training and could run the entire plant as a skelton organization. Clearly, by providing security to such men, an employer would be in a position to prevent his staff of experienced men from being decimated in adverse business periods.



ELECTRON MICROSCOPE TO NORTHWESTERN: Completion of the 200th RCA electron microscope, which makes possible the magnification of otherwise invisible particles up to 100,000 times, has been turned over to Northwestern University at Evanston, Ill. Arnold Wilson, left, is shown applying the finishing touches to the instrument as Dr. Paul Klopsteg, center, director of research at Northwestern, and T. A. Smith of the RCA Engineering Products Department, look on

Overtime Presents Problem

Another question that demands study is whether to let each week stand by itself, and pay for overtime work without offset, or arrange so that overtime hours in one week may be offset against undertime hours in other weeks. Arrangements of the latter type are permitted under the Fair Labor Standards Act which exempts overtime hours that do not increase the number of working hours above 12 per day and 56 per week—provided there is an agreement guaranteeing "substantial" annual employment or earnings. One way to settle this question is to determine which method would return most compensation to the workers during periods of downward fluctuations, and then adopt that arrangement which is most acceptable from the employee standpoint.

A difficult question in some cases is what sort of a provision to adopt to prevent harsh penalizing of the labor force as a result of technological improvements which result in increases in the man-hour production rate. A labor argument is that a company should obligate itself to maintain employment, for a time at least, for the displaced workers; the wages paid to such workers theoretically would be charged against the savings gained through the technological improvement. One possibility mentioned in the report is adoption of a fair dismissal wage for employees who have to be separated in such cases.

Of special importance to the management as well as the employees is the provision setting forth the conditions under which a guarantee plan may be discontinued or suspended. The management properly must protect itself by limiting the amount of pay for idle time it can stand in any one year, as by stipulating that the maximum shall be a certain percentage of the total pay for work performed. The employee, on the other hand, must know just how much income security he can count on under any reasonable conditions.

Certain factors have to be understood to take fullest advantage of the state unemployment compensation systems. For instance, it is better to pay full wages for a fewer number of weeks of idleness than to cut down the wages and stretch the payments over a longer period. This is because of the provision in the state laws that no unemployment compensation will be paid to an employee while he is receiving 50 per cent or more of his regular pay. Under all circumstances, the relation of a guaranteed wage plan to the unemployment compensation law of the particular state requires careful study.

The Guaranteed Wage Study Staff spent a lot of time in devising plans applicable to two "typical" steel plants, and in ascertaining the costs of maintaining these plans. Unfortunately, an inquiry by STEEL failed to reveal the nature of the operations at these plants —as to whether the plants produced in-

gots, blooms, billets and finished products individually or in any combination. Therefore, the details cited in the report can be considered only as suggestive.

In conducting the study several assumptions were made. First, it was desired to ascertain the cost of plans to be instituted early in 1947. Second, it was decided to set up the costs for a period in which upward and downward fluctuations in the volume of steel business enjoyed by these plants would correspond roughly with the fluctuations during the five-year period January, 1937, through December, 1941. Third, it was assumed that the labor force would have to be high enough to meet the work requirements by working no more than 40 hours per week on the average, and that at no time should the work-week exceed 48 hours. Fourth, it was assumed that a new employee would have to serve three months to acquire eligibility under the guarantee plan. Fifth, allowance was made for the probability that fewer employees would quit their jobs under a guaranteed wage system than had been the experience at these plants without such a guarantee system; hence, in the calculations a quit rate of 4.2 per cent a year, or 0.35 per cent per month, was used. Sixth, the plans were devised to take full advantage of: 1—The employee's income from work actually done; 2—vacation pay; and 3—unemployment compensation.

Full Wage Guarantee Costly

Results of the studies ultimately indicated that it would be exceedingly costly for these two steel plants to guarantee wages in full. That would be particularly true under a plan by which new employees became eligible for the guarantee after three months of service. Had a guaranteed wage plan been in force at these two steel plants during 1937-1941 inclusive, and had it guaranteed pay for 2080 hours (52 weeks of 40 hours) per year, the results would have been as follows:

Steel Plant A (described in the report as one "in which the man-hours of employment declined more sharply in 1938 and again in the early part of 1941 than the average for the steel industry as a whole") would have paid out over the five-year period $17.90 for idle time to each $100 it paid for actual work. During the bad period the plan might have precipitated the company into insolvency. The cost for idle time in each of the five years (in relation to each $100 of pay for actual work) would have been $4.90 in 1937, $92.90 in 1938, $24.80 in 1939, $6.20 in 1940 and $0.03 in 1941.

Steel Plant B (described in the report as having "suffered somewhat less of a decline in man-hours of employment than the average for the steel industry in 1938, and again in early 1940"), under a guarantee covering 2080 hours per year of 52 weeks, would have paid out $9.80 for idle time over the five-year period for each $100 of wages for actual work. Its idle time costs per year, in relation to each $100 paid out for actual work, would have been $0.60 in 1937, $63.80 in 1938, $10.40 in 1939, $0.00 in 1940, and $0.40 in 1941.

Republic Offer for South Chicago Works Accepted

The $91 million government-owned South Chicago (Ill.) steel plant, in operation under interim lease by Republic Steel Corp., was sold to Republic last week for $35 million by the War Assets Administration. Terms of the sale call for $5 million cash within ten days and $1,500,000 each year beginning Dec. 31, for a period of 20 years, such payments aggregating $35 million and to be in full of principal and interest.

Occupying a site of approximately 180 acres on which are 27 major and 28 minor buildings, the facility was built in 1943, to produce pig iron and steel, alloy steel for aircraft parts and gun barrels. Republic Steel was the wartime operator.

The plant embraces the following facilities: Iron ore, coal and lime docks and bins; a blast furnace of 450,000 net ton capacity; 75 coke ovens with 405,000 net ton capacity; coal, chemical and benzol by-product plants; a 336,000 net ton capacity sintering plant; slag processing facilities; blowing engine and power station; four 200-ton tilting furnaces with 571,000 net ton capacity; three 70-ton furnaces with 250,000 net ton capacity; six incomplete 70-ton furnaces; a 44-inch blooming mill of 960,000 net ton capacity; and a 36 by 32-inch bar mill of 480,000 net ton capacity.

Duluth Blast Furnace Sale To Steel & Wire Approved

War Assets Administration has approved sale for $1,835,000 of a blast furnace and related auxiliary equipment in Duluth to the wartime operator, American Steel & Wire Co. of New Jersey, subsidiary of the United States Steel Corp.

Operated during the war primarily for the production of pig iron and hot metal scrap for use in an adjoining plant owned by American Steel & Wire, the furnace has a rated annual capacity of 266,000 net tons.

WAA said that cost of the facilities to the government was $7,601,556, but that the current appraised economic and utilization value is $2,025,577, of which the successful bid approximates 90 per cent.

The blast furnace was erected originally in Joliet, Ill., in 1904 and was rebuilt in 1923. It was dismantled and shipped to Duluth in 1942. The boiler plant servicing the furnace was constructed in 1923 in Anderson, Ind., and likewise shipped to Duluth.

Aluminum Reduction Mill Rehabilitation Authorized

Contract to rehabilitate the Tacoma aluminum reduction plant, recently purchased by Permanente Metals Corp. for $3 million from the WAA, has been awarded General Construction Co., Seattle. Cost will approximate $1 million. Plans call for production about April 1. The project involves relining pots and installation of special scrubbing equipment to remove impurities released in the reduction process.

The plant has been in standby condition since operations were completed by Olin Industries which handled the utility during the war. It was built by Defense Plant Corp. It is expected 300 will be employed and the output will be 40 million pounds yearly.

Acquistion of this plant rounds out Permanente's integrated aluminum industry with bauxite from Louisiana being reduced at Tacoma and Mead, the output being shipped to the Trentwood rolling mill at Spokane to be alloyed and rolled into sheets, plate and strip.

The Tacoma plant is equipped with the Soderburg electrode system and power is furnished by Bonneville Administration.

Names Promotion Committee For Management Congress

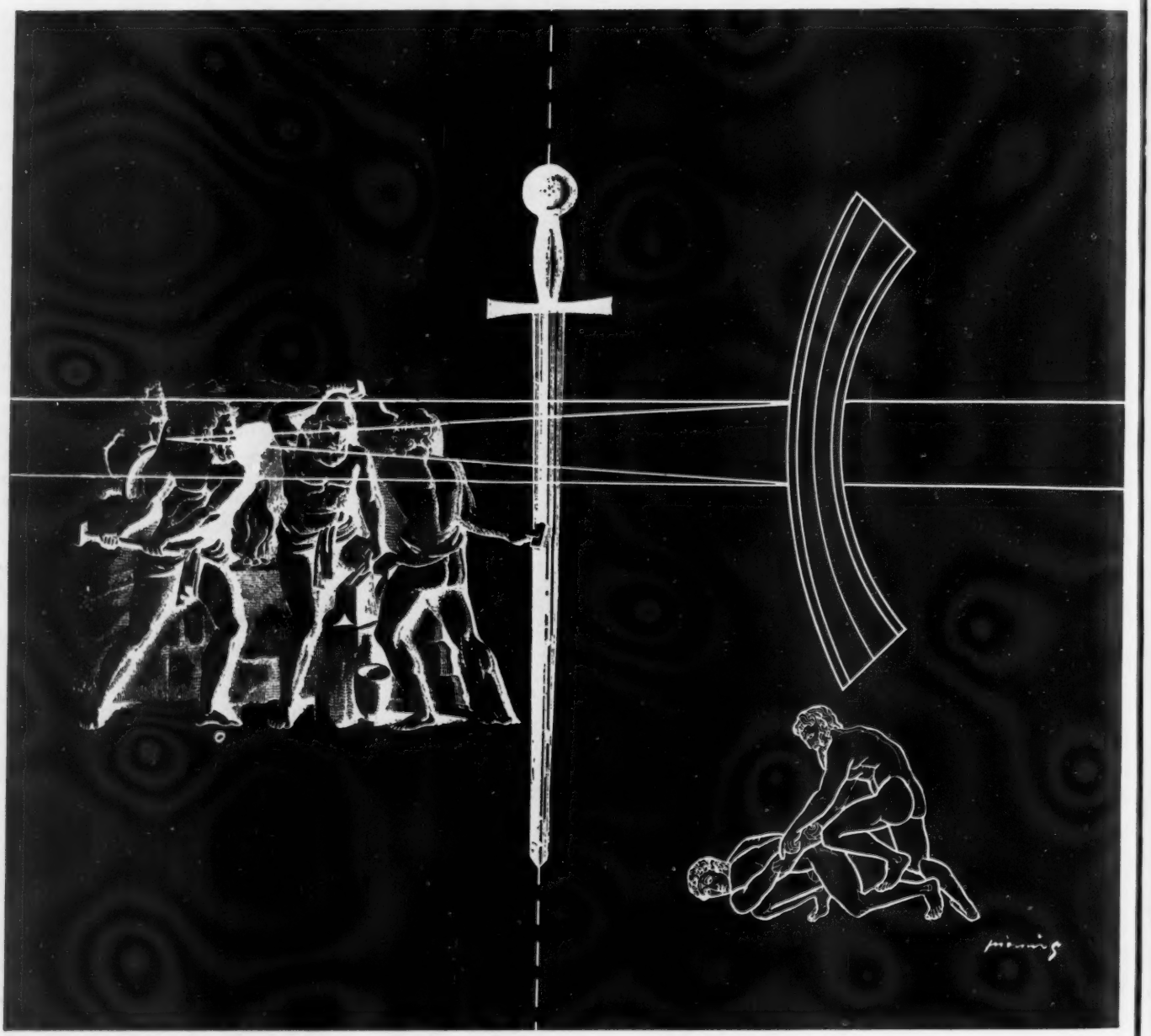
Formation of a Commerce and Industry Committee to support American participation in the forthcoming 8th International Management Congress to be held in Stockholm, Sweden, in July, 1947, was announced recently by William L. Batt, president, SKF Industries Inc., Philadelphia, and the International Committee of Scientific Management, sponsors of the congress.

Holgar J. Johnson, president, Institute of Life Insurance, and Edgar Kobak, president, Mutual Broadcasting System, were named chairman and vice chairman, respectively, of the newly formed committee, whose function will be to acquaint American management with the purposes of the congress and to enlist support of it.

ONE CAME BACK

One of the legends surrounding the making of Damascus sword blades is that the smiths developed a delayed quench consisting of thrusting the heated blade into the body of a slave. This gave the required properties, but it was prodigal of manpower, and inconvenient besides. The smith usually had to leave town to do his heat treating in quiet.

Today, metallurgists can obtain properties they need in steel by simpler, less improvident means. A little molybdenum is one way of doing this. It is a proved means of obtaining the hardenability that assures good performance in service. Practical working data on molybdenum steels are available from Climax upon request.



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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automobile workers' union files suit seeking retroactive portal-to-portal pay for past six years. May ask total of $1.5 billion of auto and partsmakers. Payment of amounts asked would mean ruination for many companies

DETROIT

VISIONS of a supreme court Santa Claus sent attorneys of the UAW-CIO scurrying to federal court here on the eve of Christmas, in a rush to file suits seeking retroactive portal-to-portal pay for the past six years. The first five actions filed totaled over $20 million, the heaviest against Briggs Mfg. Co. for $18 million, along with $2 million for 12,000 employees at a Chevrolet Flint plant. Three smaller suits were filed by the CIO steelworkers' union. Additional filings were expected later in the week, including $270 million for Ford Rouge plant workers.

If the technique of these actions, which estimates indicate may aggregate as much as $1.5 billion for the automobile industry, is an effort to pressure employers into wage increases in exchange for dropping the suits, the CIO may run into trouble for under the Hobbs Act the waiving or compromising of back pay claims constitutes a felony punishable by fine and imprisonment. So it must be concluded the union has simply seized on the Supreme Court decision in the Mt. Clemens Pottery Co. case as a means of getting something more for nothing.

To Federal Judge Frank A. Picard has been assigned the duty of determining the amount of pay due in the Mt. Clemens case, and he has indicated he will have a decision in two or three weeks, possibly even becoming a "sample employee" to determine his action. The Mt. Clemens case might never have reached the Supreme Court if Judge Picard's decision in 1942 granting employees payment for all time over 7 minutes before regular starting time in the morning and for unpaid time over 5 minutes before the afternoon starting time had not been appealed by the company. Basis of the United Pottery Workers-CIO suit was that employees were being required to punch timeclocks as much as 14 minutes before regular starting time but were paid only from the latter time. In the company's appeal, Judge Picard's decision was reversed by the Circuit Court of Appeals, but the CIO then appealed to the Supreme Court and on June 10 the latter rendered a 5-2 decision supporting the original decision.

As rendered by Justice Murphy, the High Court's opinion was that "since the statutory work week includes all time during which an employee is necessarily required to be on an employer's premises, on duty, or at a prescribed work place, the time spent in these activities must be accorded appropriate compensation." The court appended a so-called "de minimus" clause, ruling that insignificant amounts of time spent in job preliminaries need not be paid for by the employer. It remains to be seen what is meant by "insignificant" and it may even be necessary to get a further ruling from the Supreme Court.

Meanwhile, however, the CIO immediately interpreted the decision to justify pay starting the moment an employee sets foot inside plant gates, and at once started taking polls among its various locals to find just how many minutes were spent in walking from gates to job, changing clothes, etc. This time was totaled and multiplied by the average base wage rate and carried back six years, at least in Michigan where the statute of limitations is six years.

Without further clarifying legislation or a new interpretation by the Supreme Court, each suit in all probability has to be determined on its merits, even though basically the entire question is little short of ridiculous since from time immemorial plant working people have always been ready for production when the starting whistle blows, and it is hardly a function of the courts to alter this accepted practice. If an individual employer chooses to do so, that is his privilege, but for portal-to-portal pay to be made the law of the land is just another echo from the new deal era, now coming to be considered a closed chapter. Payment of the sums asked in many of these recent suits would break the companies involved.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1946	1941
January	121,934	524,073
February	84,141	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,355
June	216,637	546,278
July	331,000	468,897
August	359,101	164,793
September	342,727	248,751
October	410,466	401,369
November	379,014	373,992
Total, 11 mos.	8,881,735	4,806,474
Estimates for week ended:		
Dec. 7	93,907	92,205
Dec. 14	96,887	95,990
Dec. 21	95,940	70,875
Dec. 28	70,000	25,620

* *Preliminary.*

Nash Building 1947 Models

First 1947 model to go into production was Nash which effected a changeover on Nov. 28 with scarcely a moment's interruption and by last week had produced well over 10,000, after racking up 94,000 in the 1946 model run. Changes in the 1947 version are confined largely to the front end which has slightly wider grille, more massive radiator ornament and a restyled emblem. A new tooling treatment is used on the bright metal of the instrument panel, a two-tone effect has been applied to interior hardware trim and some new exterior paint color combinations are offered.

Ford Closed To Build Stocks

Ford closed all operations at the Rouge plant except the steel mill and other continuous processes Christmas eve in the effort to build up banks of materials and parts before reopening on Jan. 2. It is hoped that inventories can be brought into better balance and production moved ahead in more orderly fashion, although it will mean the loss of an estimated 17,000 cars and trucks.

GM Changeovers Under Way

General Motors divisions were scheduled to operate continuously through the holidays, except for closing on Christmas and New Year's days. Brief changeovers began last weekend with Cadillac first, followed by Buick and Oldsmobile, then Pontiac and finally Chevrolet. All will be rolling on 1947 models by late January. About the only readily apparent change will be in design of radiator grilles, the trend being toward wider and more massive treatment.

Packard closed for inventory the week before last and may not resume operations until the first of the year. During the

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AMERICAN INFLUENCE: This 140-horsepower, 7 passenger limousine is being turned out at the Stalin Works in Moscow. Labeled the ZIS-110, the car shows a remarkable resemblance to the Packard lines. Sovfoto

shutdown it is planned to complete transfer of body-building operations from the Briggs Meldrum to the newly-fitted Conners avenue plant, although there were rumblings from certain union employees who professed to be dissatisfied with new assignments and wage rates in the new location.

"Giving 'Em Away"

Lest anyone have serious doubts about the "high dollar" being paid for late model used cars in California, here are a few samples from the Dec. 15 classified page of one of the Los Angeles dailies:

Under the heading: "Madman Muntz Is Giving 'Em Away"

1946 Buick 4-door sedan	$3495
1946 Dodge 4-door sedan	$2395
1946 Mercury 4-door sedan	$2495
1941 Olds 6 sedan	$1495
1946 Cadillac 4-door	$4895
1946 Buick Conv. coupe	$4350

These are only a handful of hundreds of similar listings which explain why car dealers in the Middle West are driving the "used ones" South and to the Coast. While the prices asked appear shocking, at least they reflect what buyers will pay.

Borg-Warner Strike Settled

Settlement of a five-month old strike at the Long Manufacturing Division of Borg-Warner finally came last week with 778 employees slated to return to work in the next two weeks after the local union approved an average wage increase of 17½ cents an hour. The plant produces clutches for several car builders, and an interesting angle to the union agreement to end the strike was a clause "condemning" fellow union workers at Continental Motors for increasing their daily production of clutches from 1200 to 3000 during the Long division strike. All that needs to be done now is for Continental workers to pass a resolution condemning the men at the Long plant for ending their strike and forcing Continental to cut back production of clutches.

Sloan on Arbitration

In a statesmanlike address before the Boston Chamber of Commerce on Dec. 19, Alfred P. Sloan Jr., chairman of General Motors, had some interesting comments to make on the compulsory arbitration of labor disputes which is being recommended in so many quarters. Specifically he said: "There are some who advocate arbitration, compulsory or otherwise, fact-finding, labor courts and the like. I do not think they have thought that through to the end. Wage rates so adjudicated will involve all operating phases of the business, such as dividends, profits, future economic trends, distribution policies and all problems economic and otherwise now the responsibility of business management.

"There will be injected into such determinations the question of 'ability to pay'—one of the most unsound economic issues in wage determination, likewise the most dangerous to the progress and stability of the economy, and prejudicial to the interests of both labor and management. I am unalterably opposed to arbitration or anything of that kind in any form, under any conditions, and at all times except as applied to legal monopolies already regulated. It is a dangerous step. It can lead only to a regimented economy. I hold that with the limitation in scope of any controversy the final determination should be left to the parties at issue if we wish to preserve our economic freedom.

"Take a look at what happens . . as in the report of the General Motors fact-finding board appointed by the President last winter in connection with the GM strike. Here a group of academic individuals of no industrial experience undertook to adjudicate a wage controversy. They were dealing with the most involved, the most highly technical, the largest and the most embracive—in terms of its ramifications and scope of operations—industrial organization in the world today. Yet they presumed with such a background of inexperience within a space of a few days, to make a recommendation on wages and to base that recommendation upon assumptions of hours of work, trend in costs, prices, schedules of production, as well as the economic conditions of the future, and in other ways. . .if we compare their findings with what actually has happened, you will agree that it was either an economic crime or a political comedy. Perhaps it was both. Such are the inevitable consequences of wage and other determinations involving labor-management controversies if removed from the jurisdiction of the contending parties," Mr. Sloan concluded.

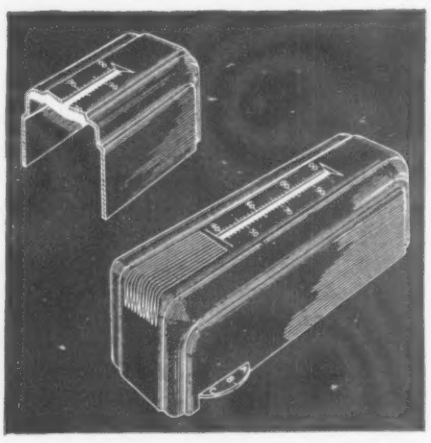
Willys Makes $402,900

Willys-Overland Motors reports net profit of $402,900 after provision for reserves and taxes for the fiscal year ended last Sept. 30, despite being closed 40 per cent of the year by work stoppages in suppliers' plants. During the period covered, the company received proceeds from sale of 316,290 shares of common stock and 155,145 shares of new preferred, and including this the company's position showed a total of nearly $33 million cash on hand and almost a like amount in inventories, equipment, buildings and expansion program. The latter represents an increase of about $20 million in plant investment over the year previous. Net working capital was also higher than a year ago by $6.4 million. Included in income figures was a federal tax credit of $854,410 from a loss carryback to the year 1944.

INCREASE CASTING STRENGTH BY AVOIDING SHARP CORNERS

Die castings can be greatly strengthened by the use of liberal fillets and rounded corners. A radius of .015" minimum is suggested in place of sharp corners, and larger radii are desirable when conditions permit their use. In addition to gaining added strength, a slight radius on corners of castings reduces die cost and promotes the durability of any subsequent plated or organic finish.

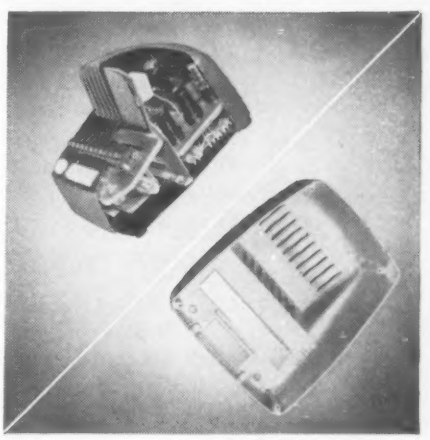
The *zinc alloy* die cast thermostat housing illustrated above and below features thin walls joined by liberal fillets both inside and outside, with no sharp edges except at the die parting. Decorative features, including raised panels on each side, the front and one end, and a series of fine beads, have no sharp external corners. Well filleted inside corners permit the buff to reach all surfaces and facilitate removal of the buffing compound. The absence of sharp corners on the exterior helps to promote a good finish.



DIE CAST HOUSINGS SIMPLIFY ASSEMBLY

Another *zinc alloy* die cast housing, this one for use in an intercommunication system, illustrates the many advantages which can be achieved by this method of production. While handsomely performing the primary function of encasing the microphone, speaker and other internal components, this housing also provides many valuable short cuts in assembly.

Integral bosses permit rapid assembly of the "innards" with just six self-tapping screws. Openings for the microphone, switch panel and control knobs are accurately located in the casting operation. These openings, together with the ventilator openings at the top of the unit, are punched out and cleaned with just three broaching and trimming dies. A sturdy, yet gracefully shaped housing with many cost-saving features is the overall result of this Designing For Die Casting—ask us, or your die casting source, for a copy of the booklet of this title.



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Chandler-Evans Becomes Division Of Parent Firm

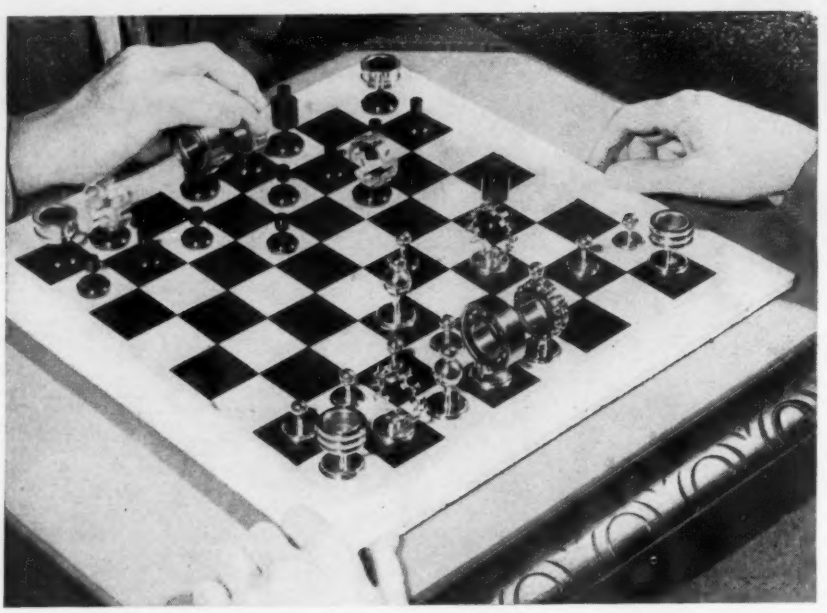
Wholly owned subsidiary to merge with Niles-Bement-Pond Co. Jan. 1. Division has $2-million order backlog

MERGER of Chandler-Evans Corp., wholly owned subsidiary of Niles-Bement-Fond Co., West Hartford, Conn., with the parent company, effective Jan. 1, has been announced by Charles W. Deeds, president of the latter company. The subsidiary will be known as the Chandler-Evans Division.

The change in corporate structure will in no way affect the operation of the business which is now located in its entirety at the plant of the parent company, Mr. Deeds said.

B. H. Gilpin, vice president and general manager, Chandler-Evans, will become vice president of Niles-Bement-Fond Co., and will continue as general manager of the division. M. E. Chandler, now vice president in charge of engineering, will become manager of engineering and research for the division.

Since the end of the war the Chandler-Evans Corp. has devoted its efforts primarily to development work in the field of fuel control mechanisms for aircraft with special emphasis on such devices as are applicable to jet-propulsion types. As a result of this development work, the division will start the year with a backlog of approximately $2 million.



CHESS GOES MECHANICAL: This unique chess set uses complete SKF bearing for kings; outer rings are removed to make queens; bishops, knights, castles and pawns are made from other bearing parts. Special sets have been presented to President Truman, King Gustav of Sweden, Navy Secretary Forrestal, Air Force General Spaatz and others

National Research Council Issues Directory of Labs

Personnel of industrial research laboratories in the United States increased 90.6 per cent between 1940 and 1946 and now number 133,515, according to the eighth edition of the directory *Industrial Research Laboratories of the United States,* which has been published by the National Research Council, Washington.

The directory, compiled by a survey of several thousand industrial organizations, includes for each reporting company the name of the president, location of the laboratory and laboratories of subsidiaries, names of key men in research, brief description of research activities, information on scientific periodicals issued and size of library, and a statement of grants for research and fellowships and scholarships maintained at educational institutions. In addition to an index by personnel, location and research activities, the directory contains an appendix listing 292 universities and colleges offering research service to industry.

Briggs Mfg. Buys Cleveland Plumbing Fixture Producer

Briggs Mfg. Co., Detroit, has purchased Republic Brass Co., Cleveland, to round out its line of plumbing fixtures and associated items. Through this acquisition and the earlier purchase of John Douglas Co., Cincinnati, the Briggs company now makes a complete line of bathroom fixtures as well as kitchen sinks and laundry trays.

Wide Usage of Porcelain Enameled Steel To Continue

"The steel industry's interest in possible inroads of nonferrous materials in the production of new home appliances, building materials, and special products for industrial use has been substantially lessened by the results of a recent survey conducted by the Market Research Committee of the Porcelain Enamel Institute," R. J. Ritchey, committee chairman, and manager, Market Development Division, Carnegie-Illinois Steel Corp., Pittsburgh, stated recently.

Of the architects questioned in the survey, 70 per cent plan to use porcelain enamel on steel for new projects they are designing or developing, and 66 per cent plan to use the material in modernization or remodeling jobs. Twenty-two per cent of the product designers questioned said they plan to use porcelain enamel on steel in new products they are preparing to market. The designers included those working on all types of products and were not limited to designer of products particularly suited to the use of porcelain enamel.

New Texas Steel Firm Buys Site for $500,000 Plant

Plans to erect a $500,000 plant in Corpus Christi, Tex., to engineer, fabricate and erect structural, reinforcing and miscellaneous steel were revealed recently when a five-acre tract was purchased by C. V. Thornton of Ft. Worth, Tex. Mr. Thornton and his brother, W. L. Thornton, are president and secretary-treasurer, respectively, of Western Steel Co. Harold T. Morton of Youngstown is vice president of the company.

The first unit of the plant, according to one of Western's officials, will be erected in January and limited operations will begin in February. It will cost $80,000. Other units will be added later.

Mr. Thornton said that Western Steel will be an agent for Truscon Steel Co., Youngstown, in Corpus Christi and 15 surrounding counties.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Cleveland Pneumatic Tool Co., Cleveland, has sold its Cleveland Rock Drill Division to Le Roi Co., Milwaukee, and the space made vacant by the sale will be used to house machinery for increased production of the former company's line of aircraft landing gears, pneumatic tools and ball-bearing screws.

—o—

Frieze Instrument Division, Baltimore, Bendix Aviation Corp., has acquired for approximately $500,000 the plant which was erected for it during the war by Reconstruction Finance Corp. The company plans to resume production soon of heating and air conditioning controls, in addition to its line of weather instruments.

—o—

Davey Compressor Co., Kent, O., has appointed Broome Truck & Equipment Co., Endwell, N. Y., as a dealer for its machinery.

—o—

Pennsylvania Salt Mfg. Co., Philadelphia, has established a new Packaging & Labeling Division.

—o—

Monsanto Chemical Co., St. Louis, has announced that construction has begun in Springfield, Mass., on a new pilot plant for the company's Plastics Division. The unit will more than double the facilities for production, research and development of plastics.

—o—

Chemical & Pigments Co., Baltimore, subsidiary of Glidden Co., Cleveland, is completing extensive expansion of its facilities.

—o—

Cleveland Tapping Machine Co., Hartville, O., has reaffirmed the representatives of its predecessor company, Cleveland Tapping Machine Co., Cleveland, in the north central industrial area. They are: Harris Pump & Supply Co., Pittsburgh; Collier Co., Cleveland; and Seifreat-Elstad Machinery Co., Columbus, O.

—o—

Struthers Wells Co., Warren, Pa., has given Sorel Industries Ltd., Sorel, Que., Canada, manufacturing and sales rights for the former company's line of tangent benders.

—o—

RCA Victor Division, Radio Corp. of America, New York, has announced that it plans production in 1947 of home television receivers having a retail value of approximately $65 million. In 1946 it is expected that 8000 such instruments will have been produced; target for 1947 is 160,000 receivers.

—o—

Chance Vought Aircraft Division, United Aircraft Corp., Stratford, Conn., has selected the name "Pirate" for its new jet-propelled plane, the XF6U-1 fighter.

—o—

Middleton & Meads Inc., Baltimore, manufacturer of household electric irons, has started production of oil burners on a limited scale. As materials shortages ease, the company plans to increase this department substantially.

—o—

Hans P. Nelson, Park Ridge, Ill., industrial designer and engineer, has established a local studio where he is engaging in product design.

—o—

Speed-Drives Inc., Detroit, has recently been organized to manufacture a complete line of selective speed drives and speed reducers. Its products are tradenamed Power-Flo.

—o—

Delta Chemical Mfg. Co., Baltimore, has acquired from War Assets Administration the oxygen plant at Sparrows Point, Md., which has been operated by Air Reduction Sales Co., New York.

—o—

Independent Pneumatic Tool Co., Chicago, has announced plans for a $1 million expansion at its main works at Aurora, Ill. Site has been cleared adjacent to the plant, and an annex, containing 85,000 sq ft of floor space for production purposes, will be erected soon.

—o—

International Business Machines Corp., New York, has begun construction of a new plant in Poughkeepsie, N. Y., which will more than double present facilities in that city. It will add 140,000 sq ft of manufacturing floor space and represents more than a third of the company's expansion program.

—o—

Aluminum Solder Corp., New York, has been granted exclusive manufacturing and distribution rights in North and South America for a new aluminum solder, called Prolyt, by Handex AG, Zurich, Switzerland.

—o—

Special Products Division, Lodge & Shipley Co., Cincinnati, has appointed the following as initial distributors of its garden tractor, the Choremaster: Busch-Lawrence Co., Cincinnati, for northern Kentucky, southern Ohio and southeastern Indiana; Don V. Booz and R. J. Walton, of Agricultural & Industrial Co., Salem, O.; Carl Van Ausdall, Liberty, Ind.; W. L. Stoller, Morton, Ill.; Hemisphere Trading Co., New Orleans; and Lonner Ralston, Portland, Oreg.

—o—

Dumore Co., Racine, Wis., has purchased a four-story factory building in that city which will be used in the company's expansion program.

—o—

Allan U. Bevier Inc., Baltimore, fabricator of steel tanks and oil heating equipment, has purchased five acres in that city as a site for a new plant.

—o—

Formica Insulation Co., Cincinnati, is planning 1947 production of laminated plastics which will greatly exceed the highly accelerated output achieved during the war.

—o—

Oldsmobile Division, General Motors Corp., Detroit, recorded a new postwar high in the first 10 working days of December with production of 9641 cars.

—o—

Research Institute of America, New York, has published a 17-page report entitled "Entering the Second Round," analyzing the technique of handling increased pay demands.

—o—

Blue Ridge Pressure Castings Inc., Lehighton, Pa., recently formed, will begin operations early in January, producing brass castings on high pressure die casting machines.

—o—

Peninsular Grinding Wheel Co., Detroit, is planning four-fold expansion of its research facilities..

—o—

B. F. Goodrich Co., Akron, O., has reopened its crude rubber purchasing office in Singapore, Straits Settlement, Malaya, with George M. Naylor as managing director.

—o—

Twin Coach Co., Kent, O., delivered a total of 96 coaches during November, the greatest number delivered in any month in 1946.

—o—

Buffalo Tank Corp., Fairfield, Md., subsidiary of Bethlehem Steel Co., has completed structural work for a 35,000 sq ft addition.

—o—

McKay Homes Inc., Cleveland, has been formed to manufacture all-metal, gypsum board homes on a mass-production basis. It is said that the government has set aside a plant in Cleveland for the company's use

Kaiser Raises Price of Plates, Bars and Small Shapes at Fontana

Consolidated Steel Corp., large Pacific fabricating company, purchased by United States Steel. Will provide Corporation with large outlet for plates, sheets and structurals. Places U. S. Steel in stronger competitive position

SAN FRANCISCO

KAISER Co. Inc. has increased the price of structural shapes, carbon bars and small shapes and plates $7 a ton at Pacific Coast basing points.

These increases on steel made at the Kaiser Fontana mill were made, according to the Kaiser firm, "to offset increased costs of steel manufacturing and to correct inequities in present pricing policies affecting the steel consumer."

As a result of the advance, steel from Fontana is now priced in net tons at $69.20 for plates, $68.20 for structural shapes and $71.20 for carbon bars and small shapes. Competitively, the price on plates compares with $62.20 a net ton for plates delivered at Pacific Coast points from U. S. Steel's Geneva works and with $61.70 a net ton on Bethlehem plates delivered on the Coast. Bethlehem's West Coast price for structural shapes stands at $60.75 a net ton and carbon bars and small shapes at $63.70 a net ton.

In its statement the Kaiser company said: "The exclusive producer of these basic steel products is entitled to a reasonable return on his investment. The previous pricing policies established by some producers who largely control and profit from the manufacture of highly finished and fabricated steel products have prevented a reasonable profit on the three basic products, structural shapes, carbon bars and plates. Many producers have just recently advanced prices on the highly finished and fabricated steel products without a corresponding increase in the three basic products. It was economically possible for some of the major producers to establish a low price on basic products because they were in a position to recover on the highly finished products."

The Kaiser price increase announcement followed by only a few days on the heels of Columbia Steel Co.'s (U. S. Steel subsidiary) purchase of Consolidated Steel Corp., one of the leading West Coast fabricating firms.

Consolidated will provide a good market for considerable tonnage of plates, sheets and structural steel produced at U. S. Steel's Geneva mill. Geneva's plate and structural rolling capacities are far in excess of normal West Coast needs and one of the peacetime problems of the Geneva plant has been to find outlets for these capacities. This will be particularly important when the supply-demand factor in steel comes nearer to parity, a point that is likely to be reached within a year. In times of a general business recession, the move also is seen by some observers as important in placing U. S. Steel in a stronger competitive position on the West Coast.

Before the purchase of Consolidated, U. S. Steel did not have any steel fabricating operations on the West Coast other than the drum and container plants of U. S. Steel Products Co. at Los Angeles and Alameda, Calif.

The offer of Columbia to purchase Consolidated has been approved by directors, but approval of stockholders still is necessary. Columbia offered to purchase all of the fixed assets, business, inventory and work in progress, with a sum of $8,293,319 offered for fixed assets with appropriate adjustments for changes in fixed assets between Aug. 31, 1946, and the closing date. In addition, Consolidated would be paid for inventory and work in progress.

Consolidated will retain cash, government bonds, accounts and notes received, claims for tax refunds, government contracts and other contracts and claims not related to the properties or business to be sold.

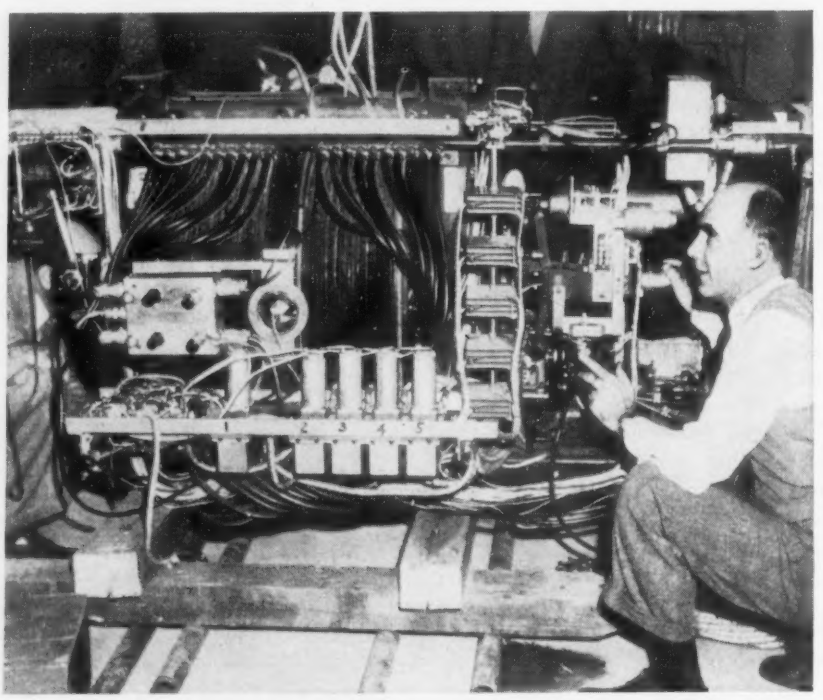
Consolidated several months ago purchased Western Pipe & Steel Co., of San Francisco, another large West Coast fabricating firm. One of Consolidated's largest pieces of work-in-process at present is engaged in fabrication of large diameter pipe for the Texas-California natural gas pipeline. Plates for the pipe were being obtained from Geneva.

Red Tape Ties Up Surplus Construction Materials

LOS ANGELES

Construction materials valued in the millions of dollars are being withheld from the market because of outmoded WAA legislation, a House subcommittee investigating war surplus property sales was informed last week in Los Angeles.

Capt. B. W. Fink, U. S. N. command-



EXPLORER: Dr. Carle Anderson of the California Institute of Technology is pictured showing a group of newsmen at Inyokern, Calif., some features of his cloud chamber equipment, used for cosmic ray research 40,000 feet off the ground. NEA photo

ing officer at Port Hueneme, one of the largest surplus goods dumps on the West Coast, testified that:

"Legislation concerning a surplus disposal is too complex. I would recommend changes permitting the WAA to sell as soon as possible goods to people who need them, eliminating much detail in priority and set-aside regulations."

The subcommittee learned that much equipment has been in storage for months because it requires four to six months at least from the time items have been declared surplus to the time they are moved to users.

Testimony disclosed that at the San Bernardino Engineers' Depot there is stored 123,300 pounds of roofing nails, among numerous other items totaling $6,000,000 in value. At Stockton there is some $10,000,000 worth of goods including equipment and materials for construction work.

Throughout the western states, witnesses declared, there is an estimated $68,149,228 worth of surplus goods, of which about 35 per cent is badly needed construction equipment and materials.

Further Construction Increase Seen in Texas

DALLAS

Texas construction and building contracts were moving toward an all-time record volume at a multi-million dollar weekly clip as 1946 drew to a close. And prospects were, according to experts, that the volume of contract awards and actual construction would skyrocket to even greater peaks by spring.

Mid-December week's total hit in excess of $21 million, headed by letting of contract for early erection of a $15 million plant for Corn Products Refining Co. at Corpus Christi for the production of basic food products, by an entirely new process, from maize crops. Work is expected to get under way in January on this project.

A new plastics plant was in prospect for the vastly expanding Gulf Coast chemicals and plastics center, with announcement that Rohm & Haas Co. of Philadelphia, one of the country's largest producers of basic products for leather, textile and insecticide industries, has purchased a 583-acre site on the Houston Ship Channel for a large operation to be built soon.

Shell Oil Co. announced plans for a $7 million plant to produce synthetic glycerin in the Houston industrial area, where Shell already has begun construction on new facilities for chemicals production that will cost at least $25 million.

Western Industry Views Freight Rate Increases as Discriminatory

Says application of new rates will boost raw material costs to Pacific Coast twice as much as to eastern manufacturers using same materials. Associations start publicity campaign to "awaken plant owners to seriousness of situation"

LOS ANGELES

UNDER the new freight rate schedules effective Jan. 1, 1947, nearly all raw materials shipped to the West Coast from over the nation will go up in price.

The same schedules, however, will bring increases in cost of only about half as much to eastern manufacturers using the same materials.

This equation, Southern California industrialists maintain, is an unbalanced one. It is one thread among scores that can make a rope to hang California industry, say two spokesmen, L. E. Osborne, executive secretary of the Aircraft Traffic Association, and A. J. Brechtel, general manager of the California Manufacturers Association.

The two groups, it was disclosed, are enlisting newspapers and other publications in a campaign to awaken plant owners in the West to "the seriousness of a situation which furthers discrimination against western industry in favor of the East, especially where it concerns the smaller manufacturer, just getting a start."

"As a result of hearings in Salt Lake City and other points, the Interstate Commerce Commission granted railroads the right to boost haulage rates to a maximum of 22½ per cent in the West," said Mr. Brechtel.

"The increases were permissive, that is, final decision was left to the roads. Already these have announced maximum rates allowed.

Nationally Spaced Sales Vital

"This puts western industry on the spot. Before the war, California manufacturers sold relatively little east of the Rockies. Now they depend for survival upon nationally spaced sales. If they do not expand, many will go under.

"The fact that wages are 20 cents an hour higher here (in Los Angeles) than the average for the nation accents the need for equitable shipping costs that will be fair both to East and West."

Mr. Osborne said: "If railroads continue to use their newly authorized powers for maximum increases in rates, they will be killing the goose that lays golden eggs."

Inability of Los Angeles manufacturers, he said, "to sell against eastern competition would eventually curb production here. That spells less business for everybody.

"The railroads' attitude toward freight increases is directly related to the amount of business they can expect from any given area. Here in Southern California, which mushroomed in wartime, it is impossible to indicate accurately tonnages that may be produced in the future.

"Thus the roads may be forced into arbitrary decisions between long-haul traffic at high percentage increases or shorter hauls through market concentration. The effect of prohibitive rates would be to concentrate the markets nearer home. This would open railroads to competition from other forms of carriers, as they well know. Hence, by throttling the west, they eventually throttle themselves."

Under applications now before the ICC water line carriers also may come in for boosts in hauling rates, Mr. Osborne pointed out. This may force development of gigantic truck fleets which, however, could economically service only near-market areas.

The weight of the freight rate decisions rests mainly on makers of goods rather than on raw material producers, it was stated.

Only 17 per cent of national buying power is west of the Rocky Mountains, the industry representatives emphasized. Hence the need for long hauls at fair competitive rates.

West Coast Leads in Residential Construction

LOS ANGELES

A report from Louis M. Drevees, director of the CPA in Southern California, discloses that during the first nine months of 1946 the Pacific states accounted for 20.2 per cent of all residential building permits in the nation as compared to 16.4 per cent in 1941.

The report emphasizes California and Texas are leading all states in home building. In other sections fewer housing units are being built than were erected during the year prior to Pearl Harbor.

Men of Industry

JAMES N. CRAWFORD

WILLIAM R. TELLER

CARL L. ZAK

James N. Crawford and **William R. Teller** have been appointed vice presidents, Bryant Heater Co., Cleveland. Both Mr. Crawford, formerly sales manager, and Mr. Teller, who was director of engineering and development, will continue work in their respective fields. Mr. Crawford joined the company in 1933. Mr. Taylor, who has directed Bryant's research and development since 1944, previously had been assistant director of the Cleveland testing laboratories, American Gas Association.

—o—

Harry J. Longeway, comptroller, Michigan Steel Tubes Products Co., Detroit, has also been named secretary-treasurer of the company and has been elected to the board of directors. **George L. Miller,** vice president in charge of sales, has been elected to the board of directors.

—o—

J. D. Seiler has been appointed assistant works manager, Milton, Pa., plant, American Car & Foundry Co., New York. Mr. Seiler joined the company in 1907, in the New York engineering department. Later, he served in the mechanical engineering department at the Berwick, Pa., plant, and in the export inspection department. In 1916, he went to the ACF Milton plant as chief inspector, and in 1926 he was appointed general superintendent.

—o—

Mississippi Valley Structural Steel Co., Decatur, Ill., has announced three new appointments, effective Jan. 1. **P. W. Armstrong,** vice president, has been assigned new duties in charge of shop operating methods and equipment at all three company plants. **E. T. Blix** has been appointed manager of the Melrose Park plant. **J. C. Arntzen** has been appointed chief engineer of the Melrose Park plant. Effective Dec. 12, **R. F. Carr,** manager of the Decatur plant, was elected vice president.

—o—

Eugene J. Ronan has been elected to the permanent post of executive vice president, Pennsylvania Flexible Metallic Tubing Co., Philadelphia. He had been acting in that capacity since his firm, Associated Consultants & Co., was retained last February to reorganize Pennsylvania Flexible Metallic Tubing Co.

—o—

Robert M. Conklin, mechanical engineer, has joined the staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in research on production materials and processes. Mr. Conklin was a development engineer for Western Electric Co., New York.

—o—

Hendrick Mfg. Co., Carbondale, Pa., has appointed three new sales representatives. **A. H. Patten,** head of Patten Engineering Co., Denver, will cover Colorado, Utah, Wyoming, Montana and southern Idaho. **Fred G. Greaves Co.,** Seattle, will handle Washington, Oregon and northern Idaho. **Orville B. Ackerly Jr.,** San Francisco, is the new Hendrick representative in northern California and the Reno section of Nevada.

—o—

W. H. Lantz Jr., Hartford, Conn., and **Rey F. Frenger,** of St. Louis, have been elected vice presidents of Federal Electric Products Co., Newark, N. J. Mr. Lantz, who has been with Federal since 1941, will be the executive head of the Hartford Division. Mr. Frenger, who joined the company last August, will be in charge of the Wm. Wurdack Division in St. Louis. Mr. Lantz had been general manager of the Hartford Division. He was chief engineer for Federal from 1941 to 1945. Before joining the Federal company, Mr. Frenger was assistant to the vice president, National Vulcanized Fibre Co., Wilmington, Del. Prior to that, he was with Westinghouse Electric Corp., Pittsburgh.

—o—

Carl L. Zak has been appointed general manager of sales, Pittsburgh Steel Co., Pittsburgh. He had been assistant sales manager for the company since April, 1945. Prior to joining Pittsburgh Steel, Mr. Zak had been secretary of Seamless Steel Tube Institute for 3 years. His new appointment goes into effect immediately. The Pittsburgh company has announced other changes in its sales organization, effective Jan. 1. **L. A. Ver Bryck** has been named assistant general manager of sales. He had been New York district manager of sales for the company. **Joseph G. Smith,** who had been manager of Pittsburgh district sales, has been appointed to succeed Mr. Ver Bryck as New York district manager of sales. **Walter D. Scalundt,** former district sales manager at Detroit for the company, will replace Mr. Smith as district sales manager at Pittsburgh. **Robert W. Mullin** has been named assistant district sales manager in the home office. **Edward L. Dull** has been appointed district sales manager at Detroit. He had been with Pittsburgh Steel's Chicago office.

—o—

Four executives of Carborundum Co., Niagara Falls, N. Y., will retire Jan. 1, 1947. They are: **Charles Knupfer,** senior vice president; **T. B. Foot,** assistant secretary; **George W. Chromann,** associate manager, Engineering & Products De-

Speed Nuts*

Give You More Assembly Advantages

Than Any Other Nuts, Regardless of Price

PREVENT VIBRATION LOOSENING

SPEED NUTS prevent vibration loosening because they provide a *double* spring-tension lock that *absorbs* vibration instead of merely *resisting* it. Insures a tight attachment for the life of the product.

SPRING TENSION RESILIENCY

In the assembly of porcelain enamel, plastic or glass parts, SPEED NUTS provide the tension necessary for a tight assembly, yet are sufficiently resilient to prevent damage due to expansion and contraction, vibration or shock.

APPLIED FASTER

SPEED NUTS put wings on your assembly lines because they start easier, pull down faster and no wrench is required to keep them from turning. Made also for use with coarse-thread sheet metal screws, requiring fewer turns to tighten, for still faster application.

ELIMINATE LOCK WASHERS

You can boot lock washers out the window, for SPEED NUTS are self-locking. They cut both material and handling costs. Because of their wide bearing surface, SPEED NUTS also can eliminate the use of spanner washers.

SELF-RETAINING

Many types of SPEED NUTS lock themselves in screw-receiving position for "blind" location assembly, eliminating expensive welding, riveting or clinching operations.

PERFORM MULTIPLE FUNCTIONS

Like a one man band, many special types of SPEED NUTS perform multiple functions, replacing two or more parts. SPEED NUT prongs can be incorporated in almost any shape or form to do the job easier and faster.

LOCK ON UNTHREADED STUDS

"Push-On" SPEED NUTS need only be pushed over rivets, nails, tubing, or unthreaded studs to lock parts so securely, you can't wrestle them off. Costly threaded inserts, drilling and tapping are eliminated—molding costs reduced—assembly speeded up.

WILL NOT CLOG

Having no threads, SPEED NUTS cannot clog with paint. No assembly delay for re-tapping threads. This is particularly important where SPEED NUTS are permanently attached to parts for blind assembly.

WILL NOT "FREEZE" TO THREADS

Having no threads, SPEED NUTS will not "freeze" to rusting bolts. They can be easily removed at any time for servicing or replacing. You'll save the repair men a lot of cussing.

WEIGH LESS

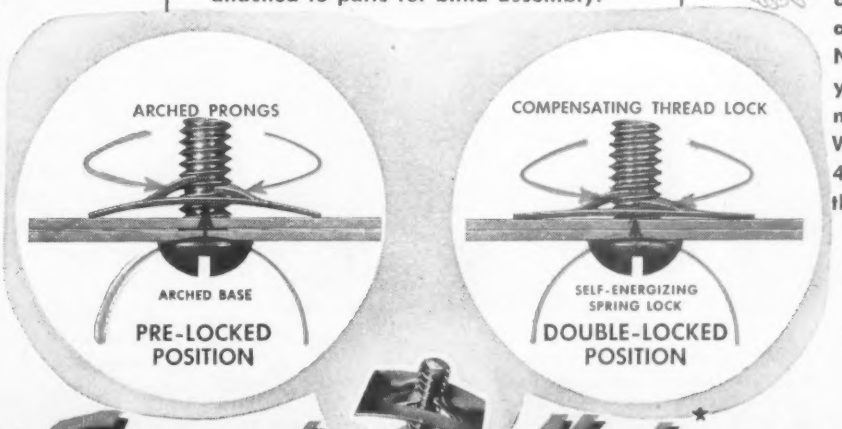
Because they are made of sheet metal instead of bar stock, SPEED NUTS are in the "featherweight" class compared with threaded nuts. By eliminating lock and spanner washers and other unnecessary parts, weight is reduced still further.

MINIMIZE SHIPPING DAMAGE

SPEED NUTS give you free insurance against shipping damage. They provide a resilient lock that defies loosening and prevents cracking of enamel and glass. With SPEED NUTS, your products will reach your customers in perfect condition.

SEND TODAY

We're not fooling about these advantages. They are very real and worth-while as any SPEED NUT user will tell you. Rush your assembly problems to us now, giving complete details. We'll show you which of the 4000 shapes and sizes will do the trick for you.



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FASTEST THING IN FASTENINGS — MORE THAN 4000 SHAPES AND SIZES

PHILIP C. TALBOT

WILLIAM S. SAYLOR

H. P. MUNGER

velopment Division, and **George H. Huntley,** who has been serving in an advisory capacity. All are veteran employees.

—o—

Philip C. Talbot has been appointed manager of the new Philadelphia branch office, Reeves Pulley Co., Columbus, Ind. He will be assisted by **Wiliam A. McCosh.** Both men have been with the company for many years, in engineering and sales positions.

—o—

Dr. Charles Allen Thomas, a vice president and technical director, Monsanto Chemical Co., St. Louis, has been elected president of American Chemical Society, for a 1 year term beginning Jan. 1, 1948. Mr. Thomas will serve as president-elect for 1 year, and as president for the ensuing year. During the war, Dr. Thomas was one of the scientists working on the development of the atomic bomb. He had charge of the final purification and metallurgy of plutonium, the 94th element. The Clinton Laboratories at Oak Ridge, Tenn., were put under his general direction July 1, 1945. After the war, Dr. Thomas continued in charge of the laboratories as work was begun to convert atomic energy to peacetime uses. Dr. Thomas became vice president of Monsanto in April, 1945, and technical director and a member of its four man executive committee in September of the same year.

—o—

William S. Saylor has been appointed manager of sales, Cleveland district, Carnegie-Illinois Steel Corp., Pittsburgh, subsidiary of United States Steel Corp. He will assume his new duties on Jan. 1, 1947, and will succeed **W. P. Andrews,** who has resigned. Mr. Saylor joined Carnegie-Illinois as a chemist at Edgar Thomson works in 1915. He entered the sales department in 1924, in the Bar Division of the general sales office in Pittsburgh. Mr. Saylor was transferred to the Cleveland district sales office of the company as a salesman in 1926, and was appointed assistant manager of sales in the Buffalo sub-office 10 years later. He became manager of sales, Boston sales office, in 1940, and had been assistant manager of sales in the company's New York office since 1944.

—o—

H. P. Munger has been appointed superintendent of the tin finishing department at Indiana Harbor, Ind., Youngstown Sheet & Tube Co., Youngstown. He had been special metallurgist at the company's Campbell plant. Mr. Munger joined the company in June, 1945.

—o—

Edward J. Lewis has been appointed assistant to **W. E. Ireland,** manager of passenger car tire sales, B. F. Goodrich Co., Akron. Mr. Lewis joined the company 17 years ago, in the Chicago district.

—o—

Rapids-Standard Co. Inc., Grand Rapids, Mich. has added three new members to its engineering staff. **Everett Lane,** formerly with Gulf Oil Corp., Pittsburgh, is engaged in Rapids-Standard product design and development. **Robert Nelson** has been appointed to the experimental and development department, to engineer electrical installation of company equipment. He had been with the engineering department, Chrysler Corp., Detroit. **Peter Koster** has been appointed to work on tool design for Rapids-Standard. He was with General Motors Corp., Detroit.

—o—

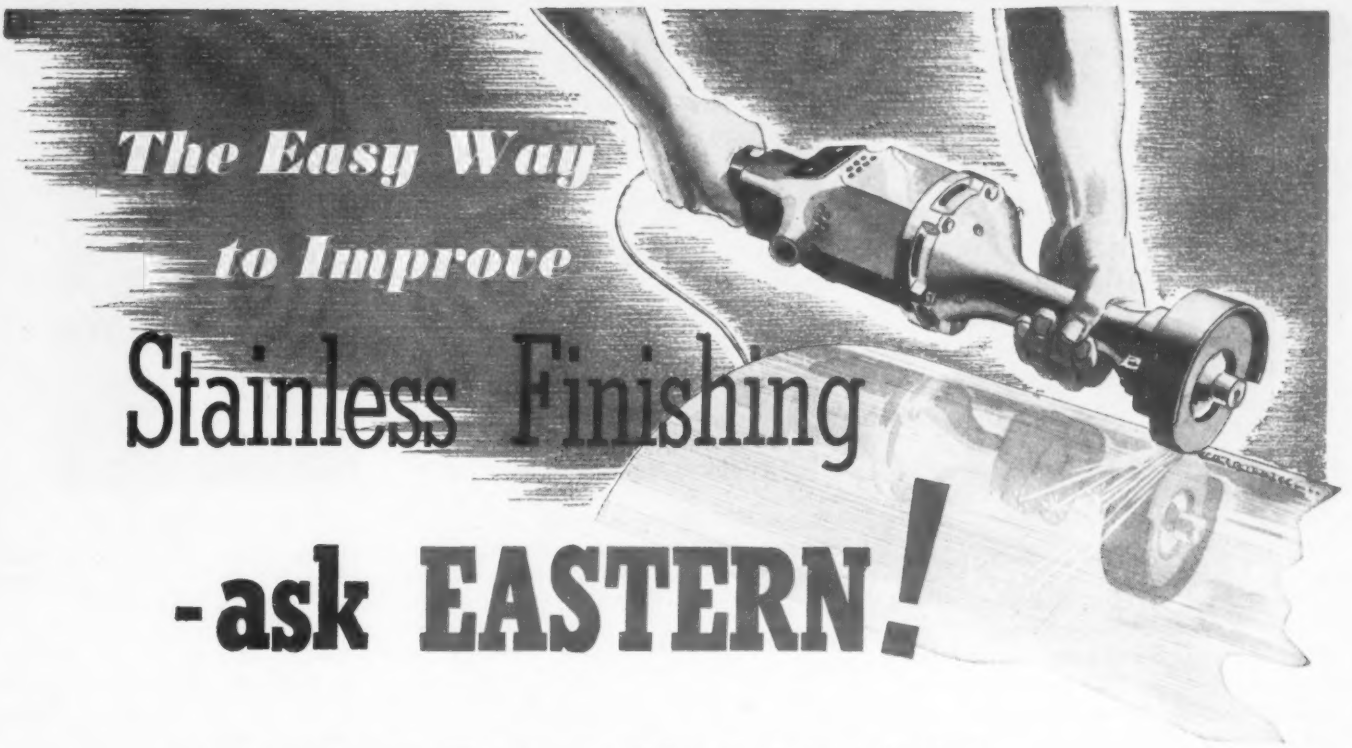
Stanley C. Hope, president, Gilbert & Barker Mfg. Co., Springfield, Mass., has also been elected president of Stanco Inc., Linden, N. J. Both companies are affiliates of Standard Oil Co. (New Jersey). Mr. Hope succeeds **F. W. Moss,** who had planned to retire at the end of this year, but has agreed to continue for another year in an advisory capacity on foreign marketing activities. Mr. Hope joined Gilbert & Barker in 1912, later

C. E. THAYER

Who has been named secretary, Ohio Forge & Machine Corp., Cleveland, noted in STEEL, Dec. 16 issue, p. 82.

JAY STRANAHAN

Who has been named sales manager, Chicago district, Washington Steel Corp., Washington, Pa., noted in STEEL, Dec. 9 issue, p. 80.



The Easy Way to Improve Stainless Finishing -ask EASTERN!

Grinding Weld Zones? What sequence of abrasive grit sizes is best for refinishing a weld zone in E-S 18-8 (Type 302) to a No. 4 polish? How can we prevent a groove at the weld?

Abrasive Type? Are different types of abrasives required for polishing and buffing stainless steels than for other grades of steel?

Blending High Finishes? Practically no polishing wheels are wide enough to cover the area of our product, so highlights show up after final polishing. How can we blend the entire area into a uniform finish?

Electropolishing? What cleaning operations are required before stainless steel products can be electropolished? Will electropolishing remove light weld scale and heat discolorations from stainless?

Passivating Necessary? We generally improve the corrosion resistance of finished stainless steel parts by passivating in 30% nitric acid. Would this be necessary if they were electropolished?

No matter what problems you may have in grinding or polishing stainless sheet or plate—when you need answers, you can get them from Eastern. Whether you are grinding welds in plate . . . buffing sheet to a mirror finish . . . or electropolishing, Eastern technical men can give you help in a hurry. Yours is an open invitation to call, wire, or write us for whatever assistance you may need in fabricating any type of stainless sheet or plate. And, to have a wealth of information always on your desk, ask for your copy of our catalog, "Eastern Stainless Steel Sheets." JMLeoE-A1

Ask Eastern for the Answer when Stainless is the Question

EASTERN STAINLESS STEEL CORPORATION

BALTIMORE 3, MARYLAND

LLOYD L. LEE

Who has joined the Machine Tool Division, Detroit, Frederick Colman & Sons Inc., noted in STEEL, Dec. 2 issue, p. 100.

HERBERT H. SMITH

Named sales agent, Mine & Industrial Division, National Malleable & Steel Castings Co., Cleveland, noted in STEEL, Dec. 16 issue, p. 82.

G. F. AHLBRANDT

Who has been elected a vice president, American Rolling Mill Co., Middletown, O., noted in Steel, Dec. 9 issue, p. 84.

becoming manager of sales in the New York office. From 1919 to 1927, he was European sales manager, and then returned to Springfield as a vice president of the company. He has been president since 1932. He has been a director of Stanco Inc. for many years.

—o—

American Foundrymen's Association, honoring **C. E. Hoyt** for "his long and highly valued service to the foundry industry and the association," has renamed its foundation lecture the Charles Edgar Hoyt Annual Lecture. Mr. Hoyt, who retired as treasurer of the association last August, joined the staff of AFA as exhibits manager in 1916. He subsequently served as secretary-treasurer, executive vice president and convention and exhibits manager. When the last title was abolished in 1943, he was elected treasurer.

—o—

George W. Benbury has been appointed manager of the new Packaging & Labeling Division, Pennsylvania Salt Mfg. Co., Philadelphia. Mr. Benbury, who served in the Navy during the war, joined Pennsalt in 1933. Joseph A. Noone has been named technical adviser on labels and registration. He has been a chemist with the company since 1937. **Edward W. Carter** has been named assistant packaging engineer. He will devote his time chiefly to studies leading to preparation of package specifications for company products. Mr. Carter had been with the Pennsalt Greenwich plant laboratory. Mr. Benbury, Mr. Noone and **Vance N. Wilson,** recently appointed supervisor of the Pennsalt tank car fleet, have been named company representatives on various industry committees, replacing **L. L. Hedgepeth,** who recently resigned from the company to become executive secretary of the Virginia State Water Control Board.

—o—

D. W. Drummond and **Arthur T. Bennett** have been elected vice presidents, Mathieson Alkali Works Inc., New York. Mr. Drummond's new title will be vice president-general manager of sales, and Mr. Bennett's, vice president-general manager of operations. Mr. Drummond joined the Mathieson organization in 1938, as assistant sales manager of the Carbon Dioxide Division. A year later he was named sales manager of the division, and, more recently, general manager of sales of the company. Mr. Bennett joined Mathieson in 1933, as a technical assistant. Subsequently, he served as superintendent of the soda ash department at the company's Lake Charles, La., plant, as assistant manager of the Saltville, Va., plant, and as assistant director of operations in New York. In 1943, he became general manager of operations.

—o—

Ralph M. Heintz, vice president in charge of engineering, Jack & Heintz Precision Industries Inc., Cleveland, has been appointed temporary supervisor of production, following the resignation of several members of the production department.

—o—

George P. Hough has been named executive administrator, Chicago district, A. O. Smith Corp., Milwaukee, succeeding **Don T. Allen,** resigned. Mr. Hough had been assistant executive administrator of the Chicago office, and manager of tubular and railroad product sales. He joined the company in 1939.

OBITUARIES . . .

Charles H. Rhodes, 66, who retired Sept. 1, 1945, as vice president, United States Steel Corp. of Delaware, died Dec. 18. He began his career as a clerk for American Steel & Wire Co., Cleveland, in 1899.

—o—

Joseph E. Wagner, 60, works manager in Alliance, O., American Steel Foundries, Chicago, died recently.

—o—

P. S. Bosworth, 52, in charge of sales for Galvanizing Division, Nashville Bridge Co., Nashville, Tenn., died recently at his home in Bessemer, Ala.

—o—

Wedworth V. Baker, president, Detroit Sheet Metal Works, Detroit, died recently at his home in that city. He was a member of the board of commerce.

—o—

John J. Watson, 77, former general sales manager, Tin Plate Division, Weirton Steel Co., Weirton, W. Va., died recently in Steubenville, O.

—o—

Charles Burton Thwing, 87, pioneer in the field of pyrometry and president of Thwing-Albert Instrument Co., Philadelphia, died recently. He was the holder of numerous patents in the field of thermo-electricity.

—o—

Edward G. Meckstroth, 58, vice president and general manager, Morris Machine Tool Co., Cincinnati, died recently. He had been with the company 30 years.

—o—

Arvid Peterson, chief engineer, in charge of Pump & Compressor Division, De Laval Steam Turbine Co., East Trenton, N. J., died in Trenton, Dec. 19.

Typical Farm Tractor Takes 1542 Lbs of Steel

A MEDIUM-SIZE, all-purpose farm tractor requires 1542.82 pounds of steel, according to information supplied to the American Iron & Steel Institute by a leading manufacturer of farm implements.

This 25-hp tractor is equipped with pneumatic tires, power take-off, belt pulley, fenders, and starting and lighting attachments.

Largest steel items purchased for this tractor are hot and cold-rolled bars, which account for 911 pounds or 58 per cent of the total. The implement also takes 423 pounds of sheet and strip steel, 50 pounds of billets, 52 pounds of structural steel, 58 pounds of terne plate, 14 pounds of wire, 14 pounds of plates, and 21 pounds of pipe and tubing. The weight of steel used in such standard parts as bolts, nuts, lock-washers and rivets is not included.

The steel weights are pounds of rough steel before fabrication into parts. Chart below shows weights and types of steel used in the various parts.

The 1542 pounds of steel used in the typical farm tractor compares with 3545 pounds of steel used for a typical automobile (STEEL, Oct. 28, p. 49). Leading steel products used in the automobile are hot-rolled sheets, 1652 pounds, and cold-rolled sheet and strip, 963 pounds, and bars, 613 pounds.

Bars are principal item, accounting for 58 per cent of steel used. Steel makes up 40 per cent of unit's total weight

In the transmission of the tractor the weight of steel used is approximately 340 pounds. The billets listed in the transmission are used in the manufacture of two "bull gear" hubs. The engine and clutch require approximately 301 pounds of steel.

The weight of steel before fabrication is about 40 per cent of the steel and gray iron and malleable iron castings. The heavy pneumatic tires add considerable weight to the tractor.

In its analysis of the steel used in a typical passenger car, the institute found 315 pounds of alloy steel, including 17 pounds of stainless, were used. Alloy steels account for about 9 per cent of the total.

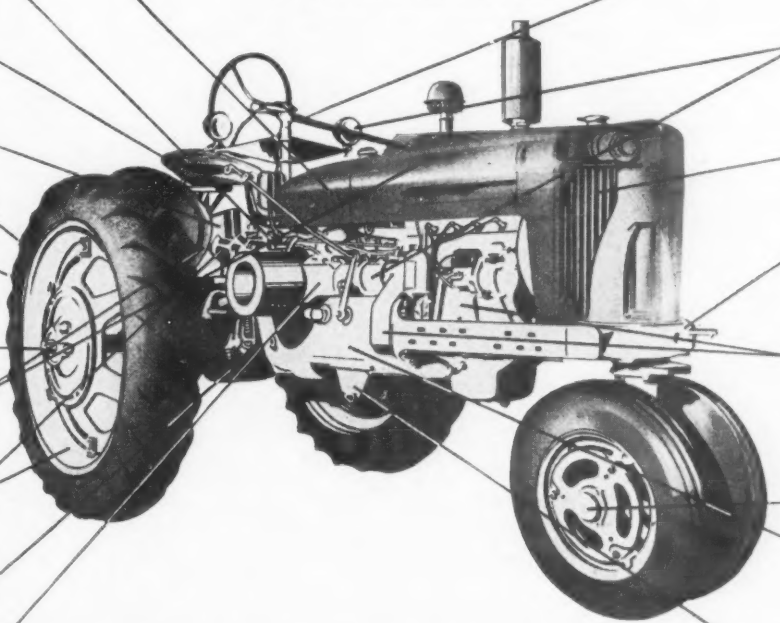
Nearly one-third of the alloy steel in an automobile is used in the steering knuckle, arms and supports, in the rear axle shaft, the transmission on assembly and the steering gear assembly. It is used in the ring gear of the rear axle, and in the rear assembly. A small amount is used in the starting motor assembly.

Automobile bearings, clutch shafts, differential gears, drive pinions, king bolts and king pins, ring gears and valve tappets also utilize alloy steels.

Carbon steels commonly are used in the following parts: Axle drive pinions, brake pedals, axle housing flanges, axle I-beams, bumpers, cam shafts, chassis frame members, body panels, frames, certain gears, fenders, hubs, jack handles, piston pins, spark plug shells, tire rims, universal joints, wheel rims, and wheel spiders.

FORMS OF STEEL PURCHASED FOR A TYPICAL FARM TRACTOR

Figures Are Pounds of Rough Steel before Fabrication into Parts



	lbs.
FUEL TANK	
Hot rolled bars	3.15
Cold rolled bars	.39
Sheet and strip	18.22
Terne plate	57.08
Wire	.18
CONTROLS	
Hot rolled bars	3.14
Cold rolled bars	1.02
Sheet and strip	5.01
Plates	5.34
Pipe and tubing	.88
SEAT	
Cold rolled bars	1.00
Sheet and strip	24.12
Wire	3.37
Pipe and tubing	10.04
TOOLS	
Cold rolled bars	5.39
Sheet and strip	4.99
REAR FRAME	
Cold rolled bars	.18
Sheet and strip	5.08
DRAW BAR	
Hot rolled bars	41.38
Cold rolled bars	.92
Structural	18.64
Plates	8.44
REAR AXLE	
Hot rolled bars	125.32
Sheet and strip	4.26
HOOD AND FENDERS	
Hot rolled bars	5.56
Sheet and strip	68.11
Wire	.87
Pipe and tubing	1.00
BRAKES-WHEELS-RIMS	
Hot rolled bars	39.38
Cold rolled bars	10.93
Sheet and strip	76.58
Wire	1.58
Pipe and tubing	1.04
POWER TAKE OFF	
Hot rolled bars	32.28
Cold rolled bars	7.07
Sheet and strip	.88
BELT PULLEY	
Hot rolled bars	.70
Cold rolled bars	32.70
Sheet and strip	1.25
Wire	.35

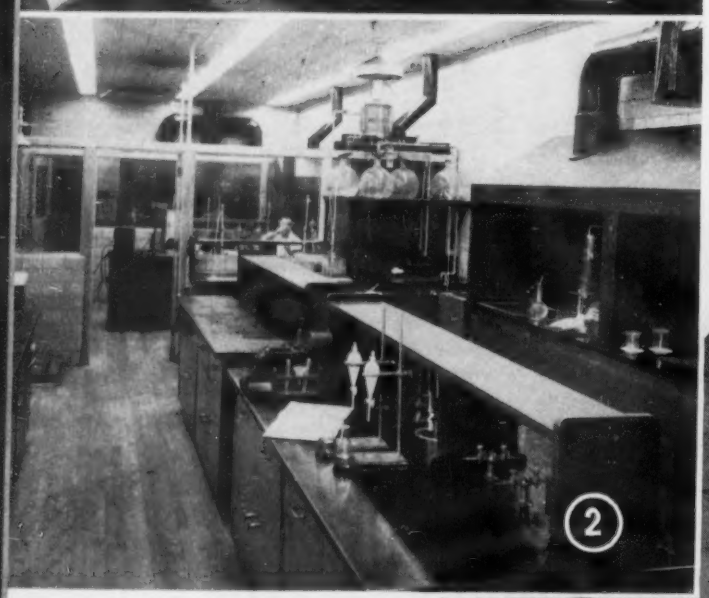
	lbs.
STEERING MECHANISM	
Hot rolled bars	12.13
Cold rolled bars	16.40
Sheet and strip	6.33
Terne plate	.03
Wire	3.14
Pipe and tubing	.08
STARTING AND LIGHTING	
Hot rolled bars	12.20
Cold rolled bars	2.90
Sheet and strip	17.82
Wire	.66
Pipe and tubing	.17
COOLING SYSTEM	
Hot rolled bars	1.06
Cold rolled bars	.65
Sheet and strip	70.16
Wire	.56
FRONT FRAME	
Hot rolled bars	22.82
Cold rolled bars	.55
Sheet and strip	.28
Structural	32.96
Pipe and tubing	.40
ENGINE AND CLUTCH	
Hot rolled bars	64.59
Cold rolled bars	122.43
Sheet and strip	104.37
Terne plate	.50
Wire	3.13
Plates	.18
Pipe and tubing	5.78
FRONT AXLE	
Hot rolled bars	52.82
TRANSMISSION	
Hot rolled bars	268.06
Cold rolled bars	7.03
Sheet and strip	13.58
Terne plate	.60
Wire	.18
Pipe and tubing	.36
Billets	50.02
HYDRAULIC LIFT	
Hot rolled bars	.31
Cold rolled bars	16.67
Sheet and strip	1.94
Pipe and tubing	.40

Here is a diagram showing the amounts of steel used in the production of a typical farm tractor. By the time the tractor is assembled the weight has been reduced due to machining operations and the scrap has been salvaged for other use.

Hot rolled bars are a principal item, accounting for 44 per cent of the weight of the steel. This chart was made by the American Iron and Steel Institute from data supplied by the manufacturer. Total steel required is 1542.82 pounds.

Modern

GEARED TO



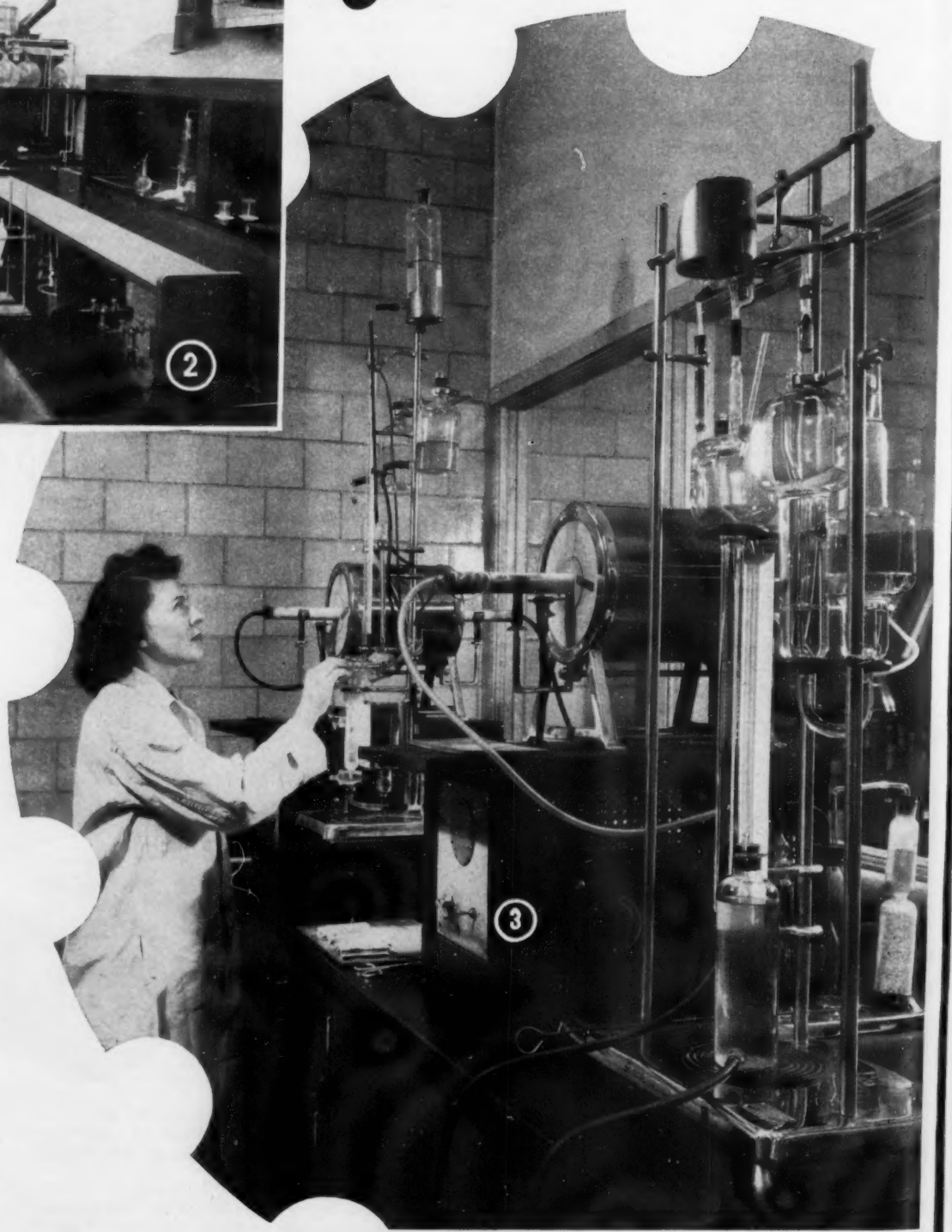


Fig. 1—Baush & Lomb research metallograph

Fig. 2—General chemistry laboratory. Note safety shower bath in rear left corner. Laboratory for special setups is entered through door in rear

Fig. 3—Volumetric apparatus for analyzing carbon, right, and sulphur

Fig. 4—Floor plan of laboratory

Laboratory Production

New metallurgical laboratory exemplifies trend toward production planning even in processing samples through various chemical and physical tests

PROVIDING facilities for carrying on routine and special chemical and physical tests on materials going into automotive parts, the new metallurgical laboratory at White Motor Co. is an excellent example of how modern planning can save steps and speed production by efficient processing of test samples.

Occupying 4600 sq ft of air-conditioned, sound-proofed floor space, the department is equipped to check all bar stock, forgings and castings used in White trucks, and to supplement the inspection work of test stations located throughout the Cleveland factory. The laboratory also examines service failures and recommends redesign or change of material, carries on experimental heat treating, x-rays castings, conducts metallo-graphic examinations and makes routine checks on lubricants.

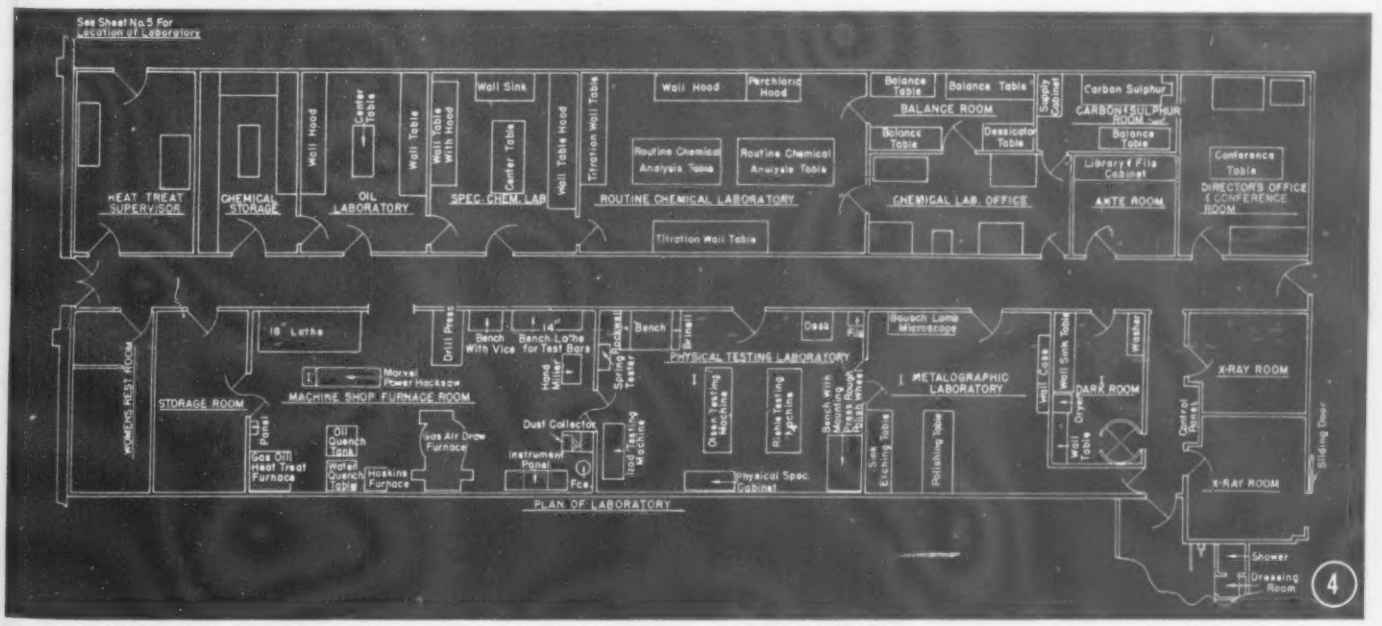
As illustrated in Fig. 4, the floor plan reflects the production idea carried through in the department. Chips for chemical analysis are produced in the laboratory machine shop. In some cases samples are drilled and in others they are turned or milled, depending upon the part. Care is taken in removing chips so that expensive forgings or castings can be used after the chips are taken off. Samples are then delivered to the laboratory office where all records are kept. After recording, they are weighed in the balance room, run through the various chemical determinations, Fig. 2, and the results returned to the office. Reports of findings are forwarded to the inspection department.

The special laboratory relieves the routine laboratory of any congestion that might result from unusual requirements of a particular sample. The combined laboratories are equipped to process approximately 30 samples in an 8-hour day, or about 120 determinations in that period.

An interesting feature of the laboratory layout is the provision for keeping standard solutions in the cabinet under the titrating table, Fig. 7. Solutions are forced into the burettes by low pressure air pumps, eliminating the danger of broken siphon tubes. There is no problem of lifting heavy 24-liter flasks to an overhead shelf where they can collect dust. The chemical laboratory also has a mechanically refrigerated General Electrical water bath, Fig. 5, for cooling samples before titration. Note safety shower bath in rear left corner, Fig. 2.

Carbon and suphur determinations are made on the Leco equipment illustrated in Fig. 3. Carbon analyzing apparatus is at the right. By this process the sample is first fused in a stream of oxygen at high temperature, 2100° F. Combustion furnace is a tube type, 9 in. long and 9 in. in diameter. The determinator measures the products of combustion from the sample before and after carbon dioxide is removed from them. The difference in volume of gases, once carbon dioxide is removed, will register on a burrette which gives the amount of carbon in the sample. Result is corrected for temperature and barometric pressure changes, using a chart which gives correction the factor.

The procedure is essentially mechanical. After weighing



the sample, the complete determination can be made in about 3 min.

Sulphur determination uses about the same principle. The sample is burned and the products of combustion are passed through an alkaline solution which changes sulphur dioxide to sulphuric acid which is neutralized by the alkali. The excess alkali is then titrated with a standard sulphuric acid solution.

On the opposite side of the laboratory, physical test pieces are machined and various tests conducted, depending upon the material and the part for which it is intended. Some idea of the scope of the physical testing laboratory's activities may be gained by considering the company's system for approving materials.

Billet samples are sent in by the steel companies from heats of alloy steel which are to be used for axle shafts, gears, pinions, and other highly stressed parts. The samples are tested for chemistry, grain size, segregation, and non-metallic inclusions. If the steel is satisfactory, approvals are returned to the steel companies who then ship the steel to the forge shops. The forge shops assign a code to the heat which is placed on all forgings made from that heat. All shipments of forgings are checked for chemistry before being put in production.

Each shipment of bar stock is tested for chemistry. As a further check, 10 per cent of the bars are tested with an Identometer located in the bar stock storage room. The Identometer operates on the principle of a thermocouple. Two bars, one a reference bar of known composition and one the unknown bar, are placed in contact. A heavy current is passed through the bars producing heat and fusion at the contact. The small amount of current developed by the thermocouple is registered by a sensitive galvanometer thus indicating if the two bars are the same or different in composition.

Castings which require high strength are tested for hardness and tensile strength, using test bars furnished by the foundries, representing heats from which the castings are made. For some castings notably flywheels, a section is cut from the casting and the test piece machined and tested in the laboratory.

The Bausch and Lomb research metallograph, Fig. 1, is used for the microscopic examination of metals. This includes tests for grain size, segregations and non-metallic inclusions in billet samples.

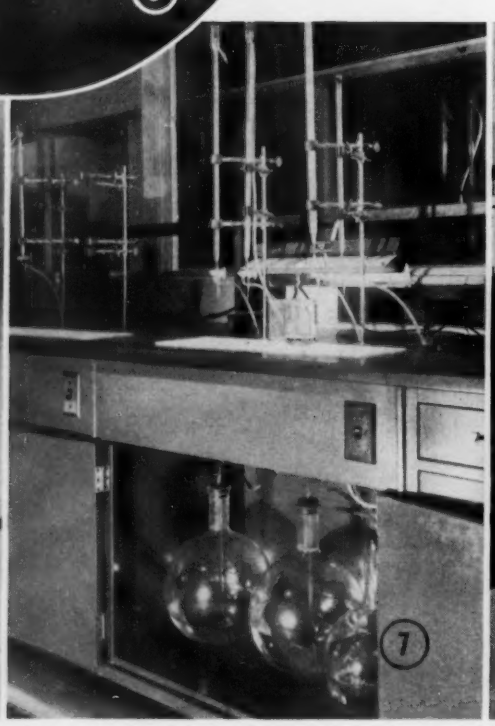
Heat treatments for various parts are worked out in the laboratory heat treating room which is equipped with an Eclipse gas-fired (*Please turn to Page* 110)

Fig. 5—Mechanically refrigerated water bath cools samples before titration

Fig. 6—Work is raised or lowered hydraulically to obtain proper focal distance under the 250,000 *v x-ray machine*

Fig. 7—Titration wall table showing cupboard for standard solutions

Fig. 8—Lowering work basket into Eclipse air draw tempering furnace



Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

WARNER AND SWASEY—1846: If Worcester R. Warner and Ambrose Swasey still were in the land of the living, each would have just passed his hundredth birthday. As it was, both of these outstanding men of machine tools and of science lived to vigorous and useful old age—Warner to 82, Swasey to 91. As it is, they live on in the spirit of the fine company which they founded in 1880, and they live on in the minds of all of us who were personally acquainted with them.

From the very beginning, these two men set their sights high, and they hit the target even though it was a difficult one to hit. They were just small town boys, Warner from Cummington, Mass. and Swasey from Exeter, N. H., when they met at the Pratt and Whitney Co. in Hartford. In a few short years they were department heads in that famous organization. Then, having saved up about $6000 apiece, they followed Horace Greeley's advice and "went West"—first to Chicago, which in 1880 proved to be too far West for machine tool building, then back to Cleveland, which proved to be just far enough West.

As I say, they set their sights high. A few days ago, Warner Seeley, secretary of the Warner & Swasey Co., showed me the ledgers kept by his late uncle and Mr. Swasey during their first two years in Cleveland. Purchases of equipment were of the best made by the best companies—many of whom, incidentally, still are in business. Sales likewise were being made, right from the start, to important companies, many of which also still are in business and still are customers after the passage of more than 65 years. These were no minor items. They covered turret lathes and other machine tools which ran into very substantial billing.

Worcester R. Warner and Ambrose Swasey were good, and they both were fully aware of that fact. They believed that the way to convince others that they were good was to build a good, substantial building, to equip it with the best machinery that money could buy, to design and build even better machinery than that which they had purchased, and then to travel far and wide helping others to solve their production problems. They either sold machines and tools then and there as the result of that confident and helpful approach, or they picked up ideas for improvements which in many cases resulted in sales on their next "swing-around-the-circuit." It is apparent that Warner and Swasey hit upon one of those "success formulas" back in the 1880s.

VEEDER-ROOT VISITATION: Despite the worst preholiday traffic jam that I can recall, I managed by good luck and good friends to get to Hartford and back during the week before Christmas. Even though I did lose some sleep and some buttons off my overcoat, that trip was worth it.

To me—and to any believer in the American system of manufacturing and in private enterprise—a trip to Hartford gives about the same degree of renewed faith that certain other believers get out of a pilgrimage to Mecca. Without in any way detracting from the pioneering done by Eli Whitney of Whitneyville, it is a fact that interchangeable manufacturing supported by creative marketing got off to a head start in around Hartford through the energetic efforts of such industrialists as Samuel Colt; Francis Pratt and Amos Whitney; Charles Billings and Christopher Spencer; George and Albert Pope; George Fairfield; and numerous others.

Among the numerous others was a man named Veeder. His name first became synonymous with cyclometers during the "bicycle craze" 50 years ago. Today his name is even better known throughout the tremendously broadened field of "mechanized counting"—an exemplified by many products of Veeder-Root Inc.

Through the courtesy of John H. Chaplin, president of Veeder-Root Inc., and with the expert guidance of several of his associates, I was shown how Mr. Veeder's basic invention for "mechanized counting"—through typical Yankee ingenuity plus the most progressive kind of modern sales engineering plus national advertising—has been spread so far beyond the bicycle field that it now penetrates every branch of industry.

The occasion was the opening of a three-story addition to the plant in Hartford, which adds 40,000 sq ft to the 250,000 previously occupied in Hartford and Bristol. With its payroll of more than 2000, this enterprise very definitely is one of those which has been making "more jobs for more people" over the years. And more than that, they are much better jobs than people used to have in the misnamed "good old days".

It really is too bad that we haven't petrified a few equivalent manufacturing plants as of 20, 30, 40 and 50 years ago so that direct comparisons might be made with conditions as of now. We all would like to be young again—but none of us would like to work in those old plants. Make no mistake about that. Furthermore, none of us would like to pay $100 for a bicycle. That was the price back in 1897 about the time when the Veeder company launched its first national advertising campaign.

One of the most interesting features of the Veeder-Root open house was an exhibit of nearly 100 well-known products into which Veeder-Root counters are incorporated. One of the latest was an automatic electrical rat trap on on which a Veeder-Root counter unfailingly records the output of electrocuted rodents.

When that manufacturer built a better rat trap, apparently one of the first things that happened was that a Veeder-Root sales engineer beat the proverbial pathway to the door of his factory—and opened up a new outlet for counters. As I already have intimated, a trip to Hartford invariably renews my faith in the American system of manufacturing and in private enterprise.

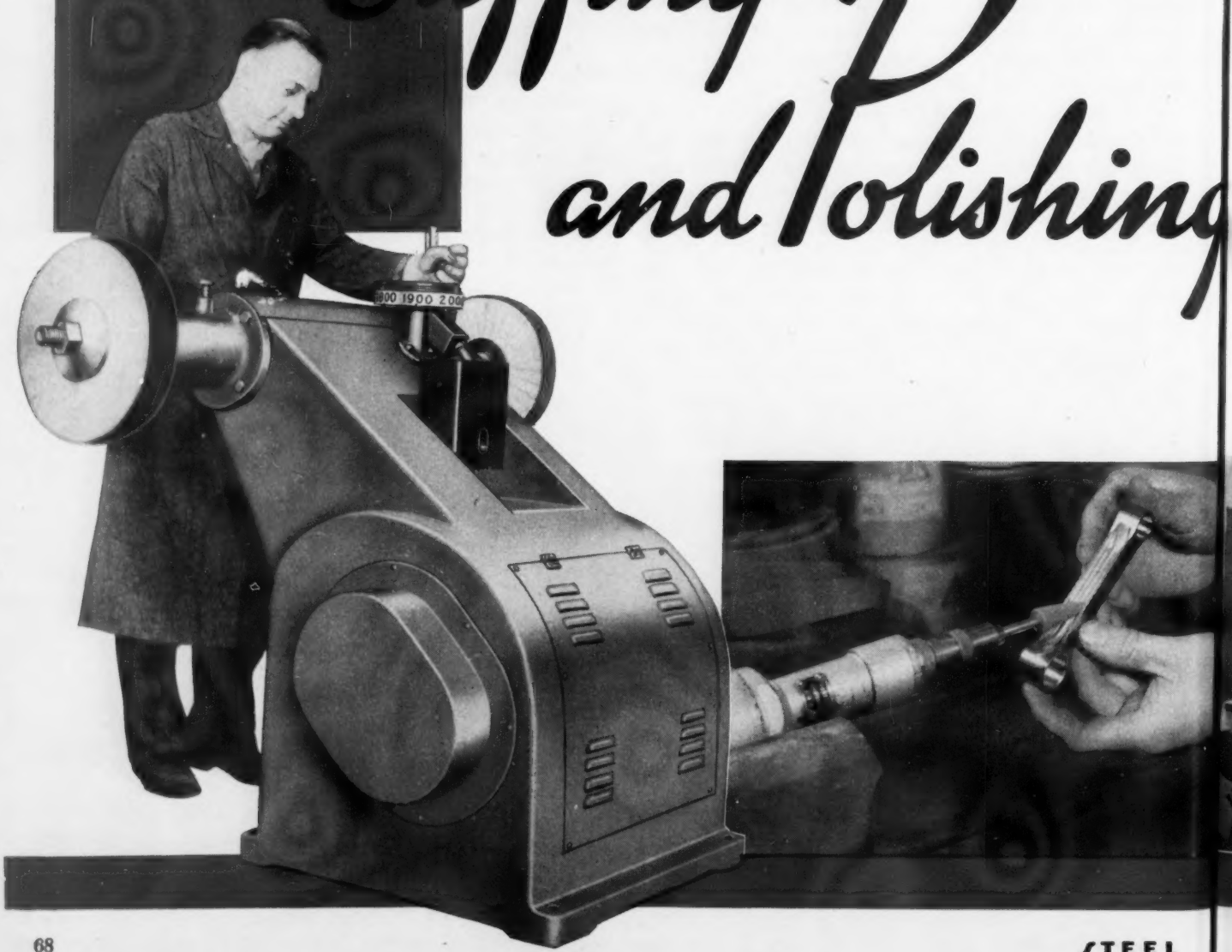
Standard finishing units and various dust-collecting systems are covered in this fourth article of the series

MACHINES AND AUXILLIARY EQUIPMENT FOR *Buffing and Polishing*

STANDARD two-arbor buffers and polishers of bench and pedestal type are so well known as to require little comment other than mention of their increased scope due to recent refinements in design. There is much work for which these machines always will be preferable.

Manufacturers whose lines include automatic buffing and polishing machines, at the same time feature modernized buffing wheel stands with driving motors housed in the base. Range of sizes is much greater than generally realized. One builder provides machines all the way from ½ to 15 hp, with speeds suited for any type of polishing wheel. Some have direct drive, others v-belt.

Some buffers and polishers now are designed with the main frame tilted forward at the top so that axis of spindle overhangs front of the base. This overhang ordinarily is about 7 in., thus providing clearance for large, bulky work. Another method of obtaining work clearance is to have arbors carrying polishing wheels extended far beyond the center pedestal. Adjustment is provided so the wheel can be set at various distances from the pedestal base, as dictated by the clearance needed for any specific job. To prevent deflection on these long arbors, each is provided with an outboard bearing on a pendant arm, which is supported by a cylindrical overhead beam. The beam in



turn has a central support which passes through a clamping sleeve on the pedestal.

Incidentally, the company making this adjustable clearance buffer also features buffers of independent spindle type. With these one operator can stop his arbor for a wheel change without interfering with the work of the other operator. Furthermore, two different jobs requiring different wheel speeds can be handled simultaeously.

There is still another type of polishing unit similar in design to the standard two-arbor unit, which accommodates four arbors and four wheels, so that four men can work in minimum amount of floor space. A husky base is provided, from each of two opposite sides of which extends a heavy bracket. Each bracket supports a spindle, so that wheels run at all four corners of the machine. The brackets extend far enough so that the spindles overhang the base of the machine about 13 in. Thus, the clearance problem for heavy or bulky work is solved.

So-called wide swing polishing stands have long spindle housing arms which reach out each way from the pedestal to allow 20 to 30 in. clearance between polishing wheel and side of the machine base. This design gives ample clearance for extremely large or bulky work.

Ordinarily one does not think of a step-cone-pulley being applied to a multiple v-belt drive. However, polishing and buffing machines are made with v-belt drive made up of four belts and double sheaves. One set of four sheaves has another set of four sheaves of a different diameter next to it. A convenient belt tension unit makes it easy to change belts from one set of sheaves to the other, thus giving the two speeds.

Some machines have variable-speed mechanism housed within the base. Speeds can be adjusted to any point between 1500 to 3000 rpm simply by turning a speed indicator dial located at the top of the pedestal. Thus, correct surface speed can be kept as a wheel wears down.

Extremely heavy polishing units are available. The heaviest machine the writer has seen has a 50 hp motor located in its base. Several series of ventilating louvers in the base insure cool running.

Dust Collection: Lung and eye protection demands use of wheel-enclosing hoods connected to efficient dust-removal systems. Hoods should be heavy, durable and readily adjustable to any size and kind of polishing wheel. Adequate dust removal now is possible even though no central collecting system exists. Individual dust collector units, each having its own motor and fan, are available for use under such conditions. Some are portable units easy to shift from one machine to another. The latter are operated by plugging into a light socket.

Heavier individual dust collectors have operating motor, fan and filter bags enclosed within a cabinet. Filtering bags are treated to make them spark-resistant.

These units are set adjacent to the polishing and buffing machines they serve. The cabinet usually is set directly behind the machine and dust collecting hoods are piped to it. Where there is not room behind the machine the unit can be located at one side. Often one cabinet is located between two buffing and polishing units so that both machines can be piped into it.

Units of this kind are not intended to take the place of central dust collecting systems. However, they do have some advantages. For instance, in cold weather there is no heat loss. Air is filtered inside the cabinet, and then discharged back into the room instead of out-of-doors. These units are used for special operations, even though there is a central suction system. In small plants, it sometimes is better to use one (*Please turn to Page* 112)

Left to right—

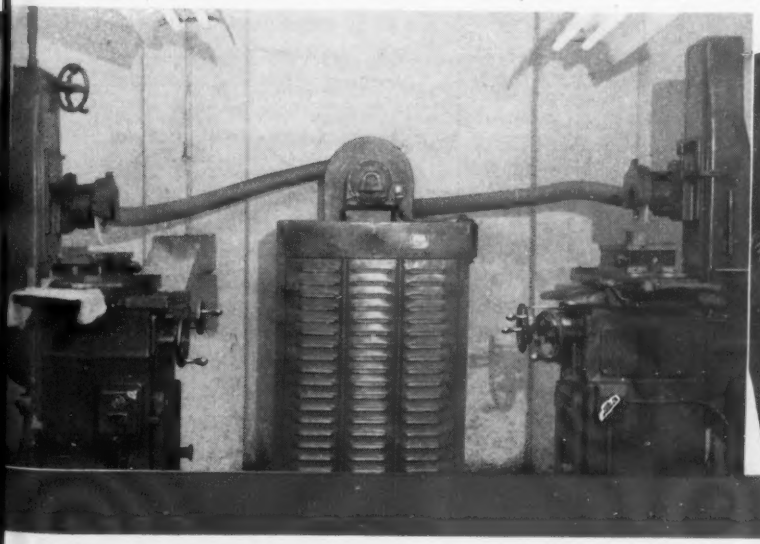
Fig. 9—*Wheel stand shown here is convenient for handling wide range of work requiring wheels of various diameters. Design of frame permits axis of spindle to overhang front of base to accommodate bulky work without interference from frame. Courtesy Hammond Machinery Builders Inc.*

Fig. 10—*Setup for finishing and polishing concave contours. Courtesy Behr-Manning Corp.*

Fig. 11—*Individual dust collecting unit servicing two surface grinders. Courtesy Ducon Co.*

Fig. 12—*Abrasive cloth element in use in flexible shaft unit finishing recesses and producing a radius on work piece, Courtesy Behr-Manning Corp.*

By JOHN E. HYLER



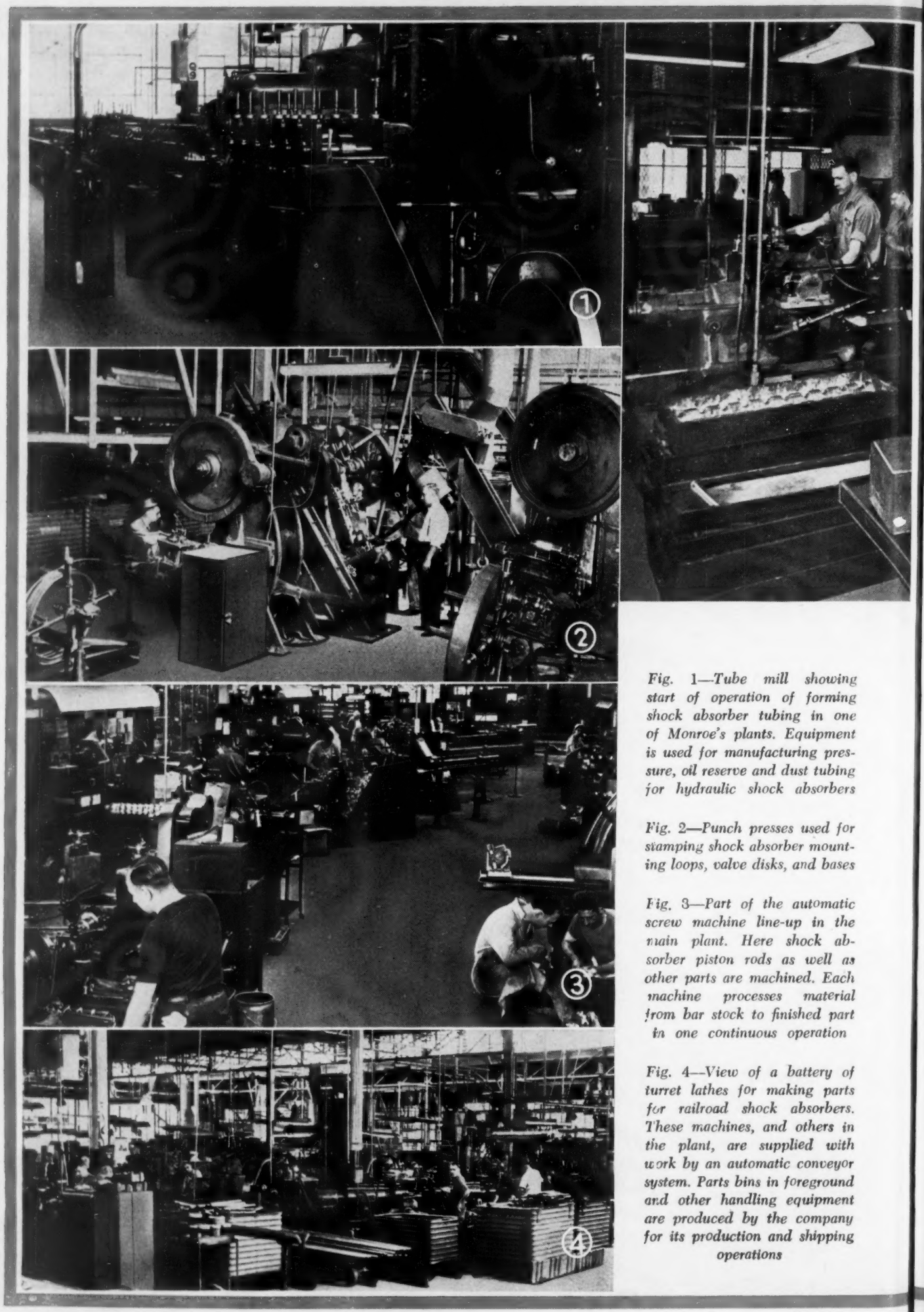


Fig. 1—Tube mill showing start of operation of forming shock absorber tubing in one of Monroe's plants. Equipment is used for manufacturing pressure, oil reserve and dust tubing for hydraulic shock absorbers

Fig. 2—Punch presses used for stamping shock absorber mounting loops, valve disks, and bases

Fig. 3—Part of the automatic screw machine line-up in the main plant. Here shock absorber piston rods as well as other parts are machined. Each machine processes material from bar stock to finished part in one continuous operation

Fig. 4—View of a battery of turret lathes for making parts for railroad shock absorbers. These machines, and others in the plant, are supplied with work by an automatic conveyor system. Parts bins in foreground and other handling equipment are produced by the company for its production and shipping operations

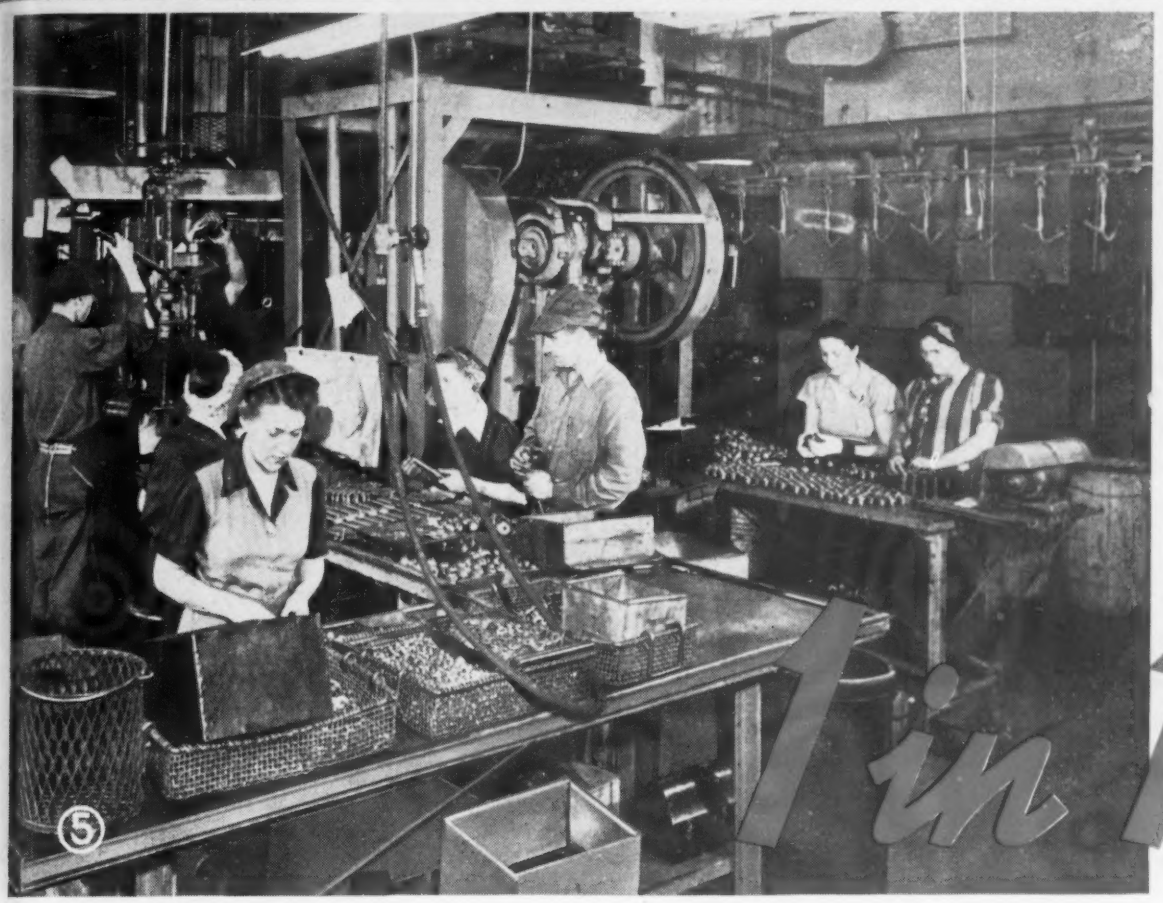


Fig. 5—Parts are inpected and then assembled

1 in 10 an Inspector

Unique system for maintaining close control of material and workmanship enables company to triple production with higher quality

CLOSE control of material and workmanship is realized through the inauguration by Monroe Auto Equipment Co., of a unique system of quality control. Highlight of the new procedure is that one out of 10 employees now acts in a testing or inspection capacity. Inspection is supervised by the men who design the products, and the men who design the tools on which the products are made. Inspection department, including engineers and tool designers, report directly to the management of the company.

In combination with this system, specially designed equipment for inspection and testing on a quantity production basis was placed in operation by the company, as a part of its postwar expansion program in two plants in Monroe and another plant in Hillsdale, Mich. This revamped inspection setup makes possible the production of higher quality parts than those manufactured in the smaller prewar output. To date the company tripled its production of hydraulic shock absorbers, sway bars and other ride control products.

Major features of the improvement and expansion program in the two Monroe plants are the installation of equipment for the fabrication of the pressure, oil reserve and dust tubing going into shock absorbers; an automatic screw machine setup perfected during the war; air gages for measuring micro-dimensions; equipment for honing of pressure tubes and plating shock absorbers with hard, chromium finishes to give mirrored, micro-dimension bearing surfaces. The new production lines in the Monroe plants include equipment for continuously forming, welding, broaching and cutting nearly 14 miles of steel tubing every day as well as specially built automatic machinery for machining tubing and rod guides. In addition to the ride control devices and products, these two plants manufacture also tractor seats and materials handling equipment.

Improved method of making valving is co-ordinated with tests of valving before it goes into shock absorbers as well as when shock absorbers are completed. The shock absorber test procedures employ endurance testing machines which operate the shock absorbers at 104 to 400 cycles per minute—each cycle equivalent to both up and down

cushioning action of the shock absorbers when a car hits a bump. Low speed tests include 2,000,000 cycles and high speed trials cover 10,000,000 cycles of continuous operation. At the low speeds, a heavy side load is imposed to approximate the side thrust in a shock absorber mounted at an angle in the frame of a vehicle. These shock absorbers, as well as other ride control products, are used not only on automobiles, trucks and buses, but also on motorcycles, tractors and railroad passenger cars.

The Monroe concern is completing another phase of its expansion program in Hillsdale, Mich., where a new plant has been equipped for the production of a new seat for motor trucks. The quality control system is being put into effect in the Hillsdale plant where molded rubber products, tire pumps and other products also are being manufactured.

Fig. 6—Final inspection and packing of automobile shock absorbers is also a conveyorized operation

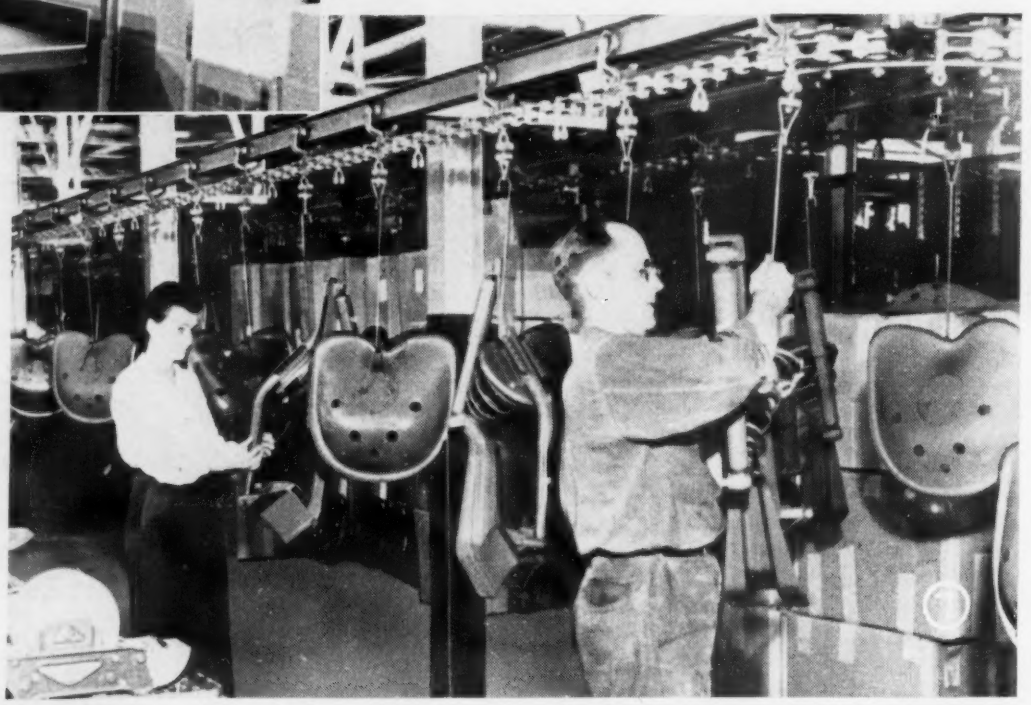


Fig. 7—Workers are giving final inspection to tractor seat parts before assembly

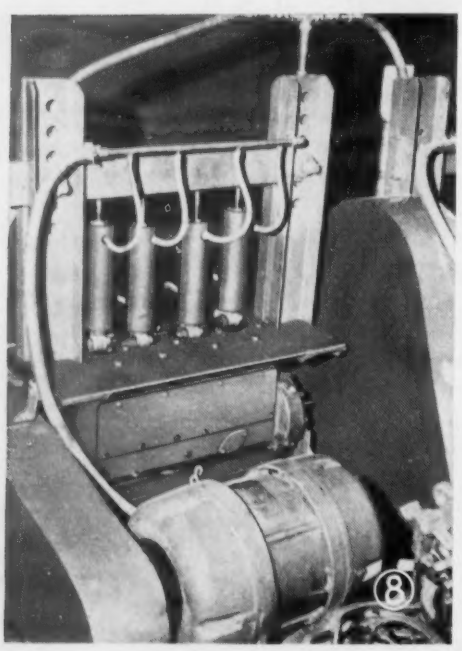


Fig. 8—Equipment for making high speed life tests of hydraulic shock absorbers. Tests cover 10,000,000 cycles and show efficiency of shock absorber rods, rod guides and other parts by revealing endurance and wear over extended periods of time. Fluid used in the hydraulic system of shock absorbers also is tested

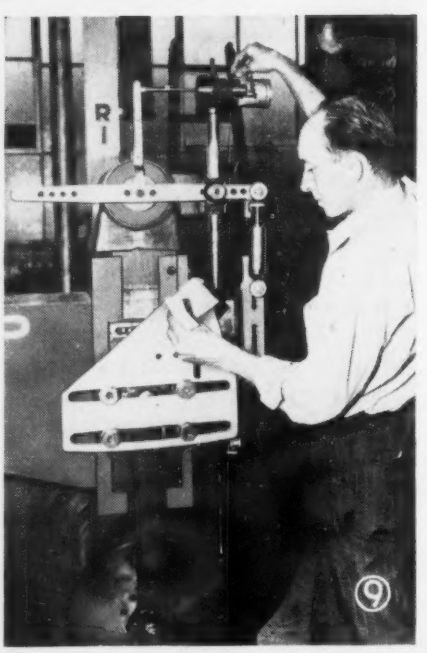


Fig. 9—Test dynamotor in engineering laboratory of the company. It is used to determine shock absorber resistance output, and automatically records resistance diagrams at varying high and low speeds

By ORVILLE T. BARNETT
Division Engineer
Electrode Division
Metal & Thermit Corp.
New York

Why use E6012 Electrodes?

Many welding engineers are puzzled at the popularity of this electrode. Here the author undertakes to point out why this type is in greater demand today than other electrodes

WITH postwar welding trends becoming established, the demand for E6012 electrodes is greater than that for all other types combined. This situation also has caused the E6010 group to drop from first place to a poor second.

Some welding engineers are displeased with the current state of affairs. It is a shame, they feel, that a high quality electrode like the E6010 should "play second fiddle" to a lower quality welding material.

While pointing an accusing finger at E6012 electrodes, these same engineers declared that these electrodes produce weld metal of low ductility; weld deposits that will not meet x-ray requirements; arcs give only moderate penetration; welds that are convex and that the electrodes are proper for poor fit-up conditions; and so on. Admittedly, these statements are true, superficially. But like any other controversial subject, there is more to be said.

Before going into industrial applications of the E6012 group, the objections listed in the preceding paragraph will be discussed. E6012 weld metal, under the AWS-ASTM A233-45T requirements, need have but 17 per cent elongation in 2 in. as welded, and 22 per cent stress-relieved. E6010-E6011 groups must exceed 22 per cent as welded and 27 per cent stress-relieved, while the E6020-E6030 types must satisfy minimum values of 25 and 30 per cent, respectively. Therefore, based on the 0.505 all weld metal tension test specimen, E6012 (and E6013) weld metal does exhibit the lowest ductility in the E60XX listing.

But welds in actual service, and tension test specimens are two different things. Many free bend specimens used to test butt welds in accordance with the ASME and API-ASME codes for unfired pressure vessels are bent a full 180 degrees, then flattened under the testing machine without disclosing any failures of the joint made with E6012 electrodes. This seems to indicate ample service ductility.

Separating ductility into theoretical and practical considerations, the E6012 weld metal possesses less ductility than several other types. Yet traveling crane trolleys, snow plows and gear blanks just to mention a few products where severe operating conditions ought to require good ductility, are fabricated with E6012 electrodes. The long term satisfactory service records of these weldments should shelve the ductility ease. (*Please turn to Page* 106)

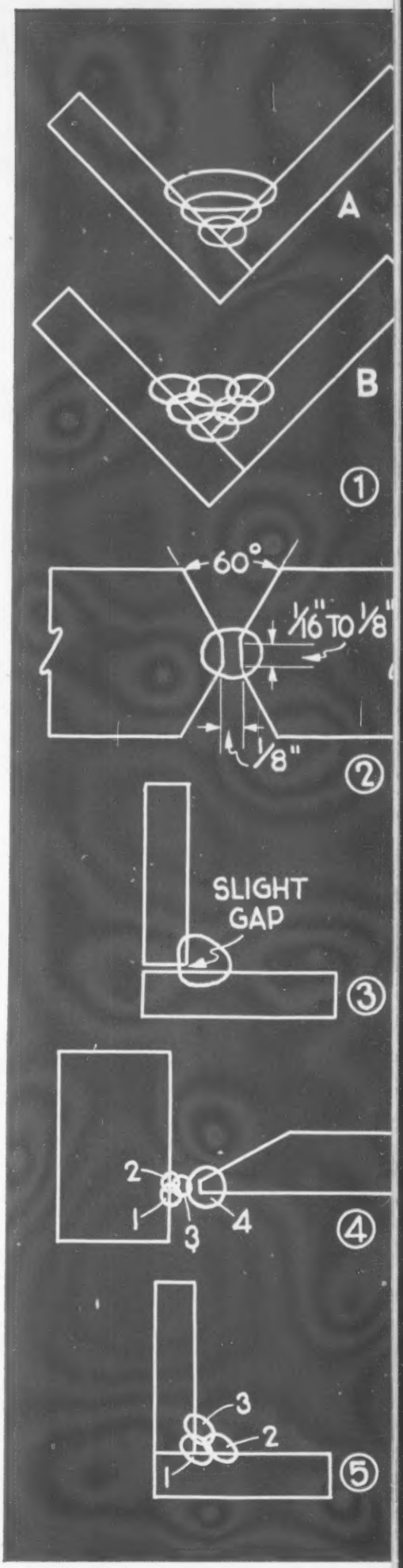


Fig. 1—The E6012 fillet weld in A may be porous, but the one shown in B should be sound

Fig. 2—Penetration with E6012 electrode welds can be controlled by joint preparation

Fig. 3—To increase penetration, a slight gap sometimes is specified

Fig. 4 — This indicates how to overcome poor fitup when using E6012 electrodes

Fig. 5—View showing how multiple bead fillet welds may be deposited without cleaning slag from each bead

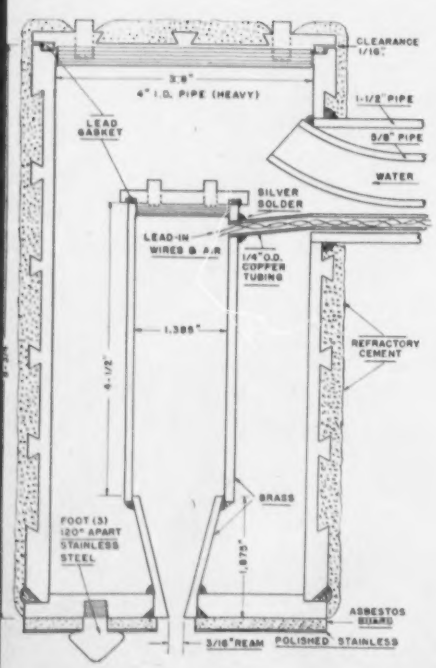
RECORDING

Surface heats

. . . with radiation pyrometer

Above—Bottom and side views of mallet-shaped pyrometer

Below—Details of pyrometer construction



MORE uniform products of steel from the slab to the finishing processes are assured by the use of a new steel surface pyrometer recently designed by scientists of the research laboratory, United States Steel Corp., Kearny, N. J. This radiation type of heat recorder takes the external temperature of nearly white-hot slabs of steel as they pass in review in the heating furnace, preparatory to entrance into rolling mills which may convert them to a variety of products ranging from ship plates and automobile and railroad car sheets to galvanized roofing and tinplated material for cans.

In addition to making certain that slabs reach the prescribed temperatures in their progress to forming and fabricating operations, the new pyrometer aids research in the design of effective furnaces, locating heat leaks and other points of inefficiency. The long-handled, malletlike instrument, which may be operated by one man, is designed to perform successfully up to a slab surface temperature of 2400° F.

Surface temperature of a furnace-hot steel slab is so great it must be measured by the radiation reaching a specially designed radiation tube through a lens lodged inside the pyrometer's cylindrical head, the reading being transmitted by wires through the long handle to a recording potentiometer. The head itself, 8¾ in. high by about 4 in. diameter, is water cooled inside its steel and brass jacket. Except for the orifice containing the lens, the working surface is of polished stainless steel backed by asbestos and stands upon 3-squat stainless steel legs.

By means of its handle, this pyrometer is thrust through a door into the furnace to come to rest on its feet above the area whose temperature is sought. It is desirable that readings be taken quickly. This can be done in 3 to 5 seconds when used with a high-speed recording potentiometer, but may require up to 25 seconds, as well as an experienced handler, if only a manually-operated potentiometer is available.

Complete assembly of the radiation unit within the head was calibrated in the laboratory by using as a target a heated plate, whose temperature was measured by a platinum platinum-rhodium thermocouple with its hot junction solidly hammered into a small, shallow hole drilled in the center of the target circle. It is believed by the inventors that the accuracy of the assembled unit is about plus or minus 5° as long as the surrounding temperature of the radiation tube is kept within the range of 80 to 110° F.

The new instrument has been patented by J. W. Percy, research laboratory staff; J. Johnston, director, and R. B. Sosman, assistant director of the laboratory, the patent having been assigned to United States Steel Corp.

By correlating the surface temperature of steel slabs with the internal temperature obtained by another pyrometer designed in 1940, furnace temperatures and radiation—or heating efficiency—may be properly interpreted. The present model was designed for use primarily in reheating furnaces. Tests have proved it simple in operation and reliable in its indications.

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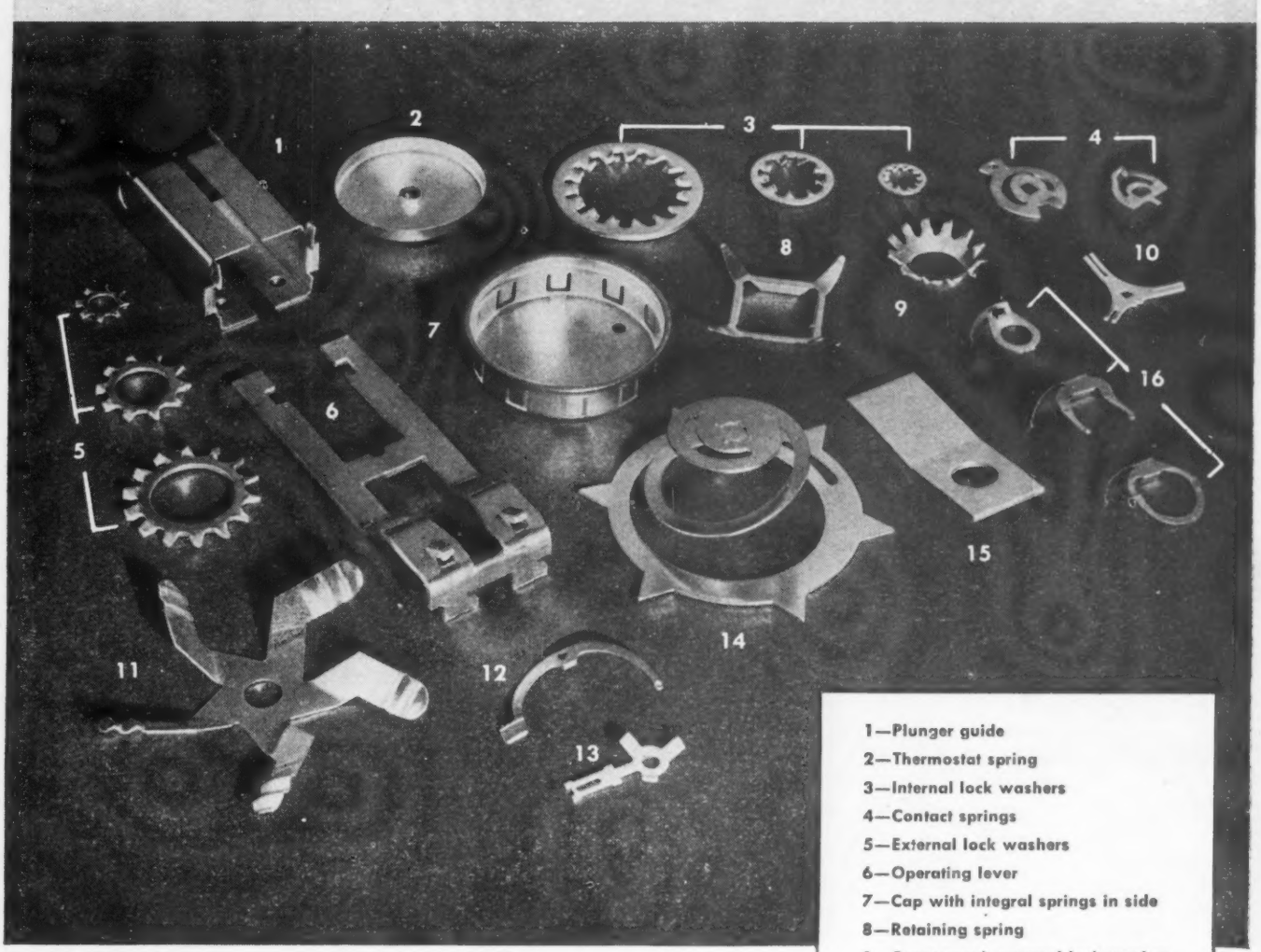

1—Plunger guide
2—Thermostat spring
3—Internal lock washers
4—Contact springs
5—External lock washers
6—Operating lever
7—Cap with integral springs in side
8—Retaining spring
9—Countersunk external lock washer
10—Pressure spring for capacitor
11—Five-contact spring
12—Contact spring for radio part
13—Pressure spring and terminal
14—Involute spring
15—Contact point for solenoid
16—Contact springs
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Engineering News *at a Glance*

KINDNESS WITH FINESSE: More proof that we live in a "be-kind-to-suppliers age" in the battle for materials comes from Union Chain & Mfg. Co., Sandusky, O. Callers at the plant are handed a 4-page folder upon arrival, front page of which says, "Union Chain Welcomes You Cordially. . . ." This is followed by a blank space the size of a business card in which the receptionist has written in the name of the caller. The two inside pages offer a variety of cordialities including how to remind the person concerned that the caller is still waiting, to how to get to the wash room. On the back page is a map of Sandusky area, showing location of auto routes, railroad and bus stations, resturants and important companies.

SILENT MOWING: Latest innovation in lawnmowers is a self-propelled electric power unit that starts as easily as flipping a switch. Unbelievably quiet in operation and highly maneuverable, the mower operates 2 to 3 hours on one battery charge. After use, it is simply plugged into a 110-v outlet and readied for the next assignment. The mower is being manufactured by LeJay Motors Corp. of Minneapolis.

CONDITIONS ALUMINUM SURFACES: Simple, quick, economical method of preparing surfaces of aluminum and its alloys for painting or lacquering, according to Colonial Alloys Co., Philadelphia, is to apply its recently developed solution for 30 to 60 sec at room temperatures. Called Paintbond, the product may be applied by spraying, brushing or dipping, the latter method being preferable. Procedure consists of first freeing the aluminum of greases and other foreign matter, immersing the metal in the solution for about a minute, then rinsing and drying. The metal at this stage is ready for painting or lacquering. However, primers suitable for aluminum should be used prior to final finish.

REFINED "BOAT POWER": New type 6-cylinder marine gasoline engine now manufactured by Fageol Products Co., Kent, O., employs a horizontal design and develops 225 hp. Although it develops the same power output, it weighs less than two thirds as much as conventional marine engines. Horizontal design reduces the engine's overall height 30 per cent less than previously possible. With exception of block and head, aluminum alloy construction is used throughout. The 965-lb engine's power-to-weight ratio is 1 hp for every 4.3 lb of weight. All parts are stressed for about 4000 rpm, even though maximum recommended speed is 3400 rpm. Although of the flat mounting type, the engine can be installed vertically for replacement applications.

RESISTS TERRIFIC HEAT: Creep and stress-rupture properties of a new stainless steel alloy, GT-45, was demonstrated at the Power show in New York recently, by American Rolling Mill Co. Originally developed for use in gas turbines, the steel is expected to find widespread application for many high-temperature requirements—parts for jet engines, exhausts etc. Its strength and toughness is said to be far greater at elevated temperatures than the regular stainless grades. It also has good forging and machining characteristics.

BEARINGS PER OUNCE: Mass production methods are used by SKF Industries Inc., Philadelphia, in making metal balls, half the size of pinheads for new-type fountain pens, as bearings for instruments and other delicate applications. To indicate their sizes, about 7000 of the tiny spheres can be placed in four ¼-oz bottles. Although of steel, they are four times more valuable, weight for weight, than gold. The bearings cost $125 per ounce.

TWIRLS 3000-LB ENGINE: Developing enough energy to start 36 average autos, the Jack & Heintz JH-4 starter is capable of spinning the crankshafts of airplane engines with piston displacements up to 4360 cu in. Weighing only 39 lb, it undergoes terrific stresses during the few seconds of its concentrate power output in twirling a 3000-lb engine. Jahco engineers in Cleveland designed the starter to outlast the engine. For example, armature bands which are resistant to corrosion by sea air and condensation, are of Monel. According to "Mechanical Topics," the strength needed for the high rotational inertia generated by the whirling armature segments is supplied by 0.050 gage Monel strip. The starter is a combination electric inertia and direct-cranking unit.

FEATHER-WEIGHT RUBBER: Lighter-than-cork rubber, used during the war to protect delicate radar installations, now is being made available for insulating purposes. In New York, United States Rubber Co. announced that in insulating refrigerators and freezing units, the cellular rubber is more effective than cork. It can be made hard or soft, and will not absorb moisture, the material also being resistant to fire, rot, acids, oil and termites. The cellular rubber is made by an expanding process in which chemicals containing nitrogen are mixed into a mass of rubber. Upon release, the nitrogen acts as a blowing agent, producing thousands of microscopic cells, individually separated from one another. The insulation is especially recommended for refrigerator trucks, where materials now used absorb hundreds of pounds of moisture, adding to the vehicle weight.

YOUNG YET OLD INDUSTRY: Precision casting should be considered when a great many setups are necessary to produce a part by conventional means, when an unusually shaped part is contemplated, or when better materials may be used that are not easily formed or machined, L. S. Bergen, Bergen Precision Castings Co., stated before the Cleveland chapter of ASM recently. Cost of precision castings is chiefly labor rather than materials, even when highly alloyed metals are pressed into service. For this reason, the number of pieces per flask is the controlling factor of price. For the present, the size of the flask that may be used is limited by a number of factors, but better waxes, better investments and improved production line methods promise a bright and expanding future.

NO WARM MEAT: Frozen-food cabinet owners will soon be able to obtain "a watch dog" for their boxes, it was learned in Schenectady, N. Y. General Electric announces the development of a thermostat that initiates an alarm in adequate time to permit correction of the trouble before the contents of the box are spoiled. The alarm operates if the temperature rises above the set limit, if the power supply is cut off or if an alarm wire breaks.

SOLVED BY A WAX MODEL: Turbine blades are now being turned out as precisely as if each had been machined in a lathe in the precision-casting lab set up by Westinghouse Electric Corp., Pittsburgh. Blades previously were stamped out of red-hot metal by a heavy forge. Development of a more durable metal alloy made the blades so hard that the drop-forge dies suffered excessive wear and frequently broke. Now a metal die is made from a master pattern and molten wax is injected into the die to produce

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a wax model of the pattern. Twelve of these models are mounted on a wax base and covered with a metal flask into which is poured a mixture of clay and silica. After the cement has hardened, the flasks are put into an oven where the wax is melted and burned away. Then molten cobalt-chromium alloy is poured into the cement-like mold, filling the cavity left by the wax. After cooling the cement is simply knocked away, and the blades are finished.

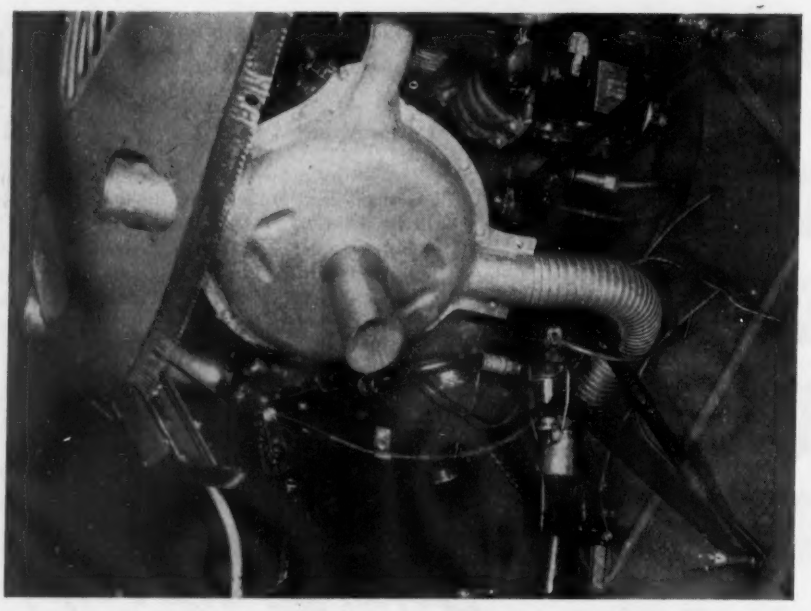
ROBOT PRODUCTION LINES: A prediction that assembly of auto and commercial vehicle bodies will in the future be performed in a constant flow using moving fixtures and automatic welding machinery—was made recently before the Society of Body Engineers, Detroit, by L. M. Benkert, sales manager of Progressive Welder Co. His prediction, which would involve an entirely new concept in sheet metal fabrication, also embraced manufacture of all types of sheet metal products. Benkert described types of welding machines that would enable producers to correlate them into one "moving pattern," controlling production flow in much the same manner as a signal tower controls the switching operation in a railroad yard. He said the machines are available today, it only remains to tie them together in such a manner that production flow is continuous, eliminating most of the stacking and storing of parts and subassemblies between operations.

SCALE MACHINE MODELS: Precision cast metal scale models are being manufactured by Triometric Engineering Co., Pittsburgh, to aid designers and engineers in studying plant layouts, manufacturing processes or production sequences. The models, made so they are distinguishable readily as representative of the actual machines or equipment, are scaled ¼-in. to the foot. They present a three-dimensional picture that materially aids in improving plant layout. By photographing, various arrangements of the models can be compared to obtain the most efficient setup.

ALUMINUM YARN: Aluminum now is heading for the fashion centers in form of a new metallic fiber, called Lurex, being introduced by Dobeckmun Co., Cleveland. Developed by the company during the past 8 years in collaboration with Eastman Kodak Co., and Aluminum Co. of America, the product is an aluminum foil sandwiched between two plies of specially formulated plastic film. The yarn is impervious to tarnish, much lighter than ordinary metallic yarns and easy for textile workers to handle. It is intended for use in all forms of textiles, combined with wool, rayon, silk and cotton. It already is being used in the fields of dress fabric, bathing suits, shoes, coats and upholstery fabrics.

SERVES SEVERAL FURNACES: Medium and high carbon steels may be hardened or brazed and powdered metals sintered without decarburization in a number of furnaces served by a central station atmosphere generator now being produced by Lindberg Engineering Co., Chicago. The company reports the generator, called the Hyen, produces a cleaner and drier gas of consistent analysis, no carbon dioxide, dew point of minus 10° F and methane in the amount of 1.0 per cent. It requires no charcoal and does not have to be burned out periodically to remove soot. Temperature, mixing, pressure and flow control are fully automatic, and gas ratios do not have to be readjusted when furnaces are cut in or out of the line. The generator, an endothermic catalytic cracking type, operates on city gas, natural, propane or butane, using gas only for both atmosphere and heating. It can be adjusted simply to produce gas in equilibrium with any steel from 0.05 to 2.0 per cent carbon content.

CEMENT FROM SLAG: German iron and steel foundries in recent years profitably utilized one half to two thirds of their total blast furnace slag for making cement, according to a report in possession of the Office of Technical Services, Washington. In a typical German cement plant, the hot slag from the blast furnace is granulated by immersion in water. This freezes the slag so quickly that it remains glassy and retains its maximum hydraulic properties. The granulated product then is taken to the feed end of the portland cement plant. Here slag and limestone, in the ratio of one part slag to 1.4 parts of limestone, are dried and ground in ball mills and fed into a rotary kiln. Final product is made by adding proper proportion of slag to regular cement clinker and gypsum, and grinding them together. Principal advantage of slag cements is their low fuel consumption, since they require only about 45 per cent as much coal as other cements. Although blast furnace cement develops its strength less quickly than portland, it attains equal strength in time, the report said.



MANUFACTURED of the same heat-resistant steel alloy used in large, high-horsepower engines for military planes, this 8-lb stainless steel muffler, developed by the Metal Products Division, Ryan Aeronautical Co., San Diego, Calif., provides warmed cabin air in light civilian planes and eliminates effectively objectionable engine exhaust noise. Shown for the first time at the National Aircraft Show in November by Air Associates Inc., aircraft supply house, the stainless development is said to be the first approved by CAA for lightplanes. In tests, the Ryan muffler demonstrated carburetor heat rise chraacteristics far in excess of government specifications which require a 90° F rise with 30° F outside air temperature at 75 per cent engine power. The unit can be installed without removing the propeller or engine accessories.

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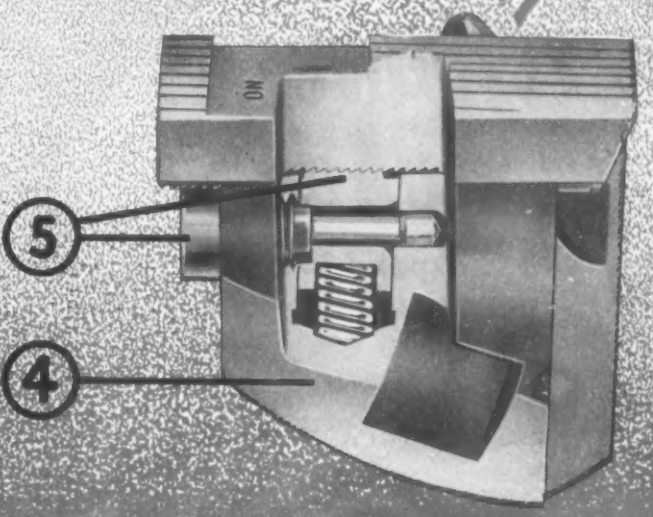

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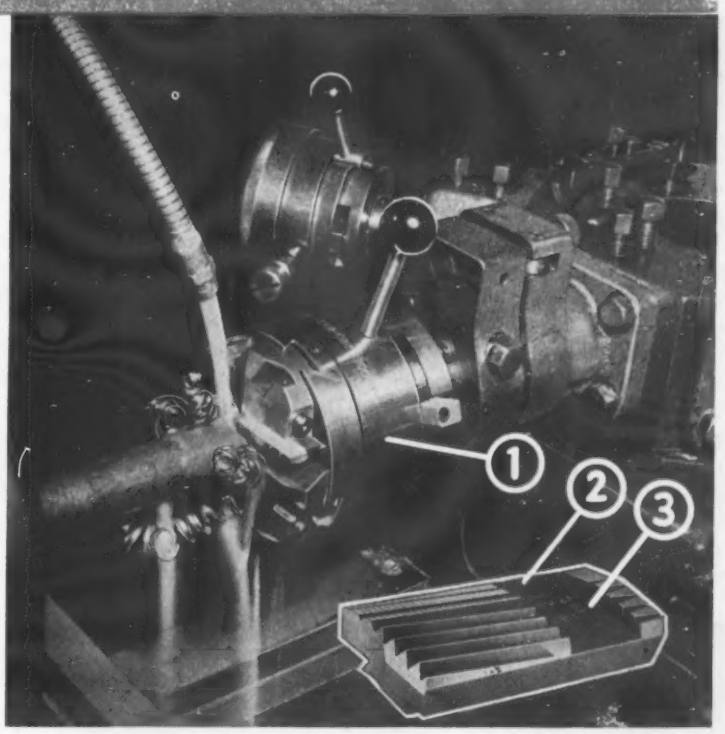

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Uses of SILICONE RUBBER

. . . expand in high-temperature field

Fig. 1—Effect of high temperature on natural rubber, right, and silicone rubber, left

Fig. 2—Silicone rubber as used as a gasket in high-temperature baking ovens. Gaskets of this material withstand continued high temperatures and will not adhere to metals at these temperatures

ABILITY to remain soft and resilient at high operating temperatures was one of the major considerations in adapting silicone rubber to many new uses. Remaining unaffected when subjected to temperatures ranging from minus 55° to 520° F, the product also is being used as an electrical insulator and as a gasket material. Fig. 1 shows effect of high temperature on natural rubber as compared with silicone.

At present, chemical department of General Electric Co., Pittsfield, Mass., is making silicone rubber in extruded rods, tubes, flat strips, as well as various thicknesses of sheet stock and many conventional and intricate molded shapes (see Fig. 3). In sheet stock form, the material also may be reinforced with plies of glass and asbestos cloth to give greater strength.

As a gasket material, silicone rubber was found to be very satisfactory, primarily because of its heat resistance and nonadherence to metals properties. During the recent war, it saw gasket use in searchlights, superchargers and other electrical equipment. Now it is finding extensive use in aircraft, heat sealing equipment, various types of lighting equipment, baking ovens, diesel engines and vacuum systems.

Continuous use in searchlights at 340° F found the development still in good condition while 220° F is generally accepted as the maximum for most synthetic and natural rubbers, GE states. Aged 1 year in a hot, dry circulating oven, silicone rubber did not appreciably change in surface hardness or flexibility.

Other new uses for this material are as gaskets in radial aircraft engines and in jet engines as well as for new type of oil seal which operates around high speed shafts at temperatures of 350 to 400° F. In high vacuum systems this type of gasket does not harden and crack due to the escape of volatile plasticizing components at elevated temperatures because of the absence of any plasticizing oils in the formulations.

As a gasket material in diesel engines, gas turbines and air compressors, the material is advantageous because of its ability to hold up under high operating temperatures and because of its low permanent set. For high temperature baking ovens, such as shown in Fig. 2, it allows less entry of air leakage of hot air because of its uniformity at varying temperatures. It is said to provide excellent furnace door insulation, not only because there is less necessity to make the doors to close tolerances, but also it will not stick to the door or oven and tear upon opening.

Silicone rubber is also being used for press pads in heat sealing equipment where it withstands continued exposure at 300 to 350° F with little or no change in flexibility and surface hardness.

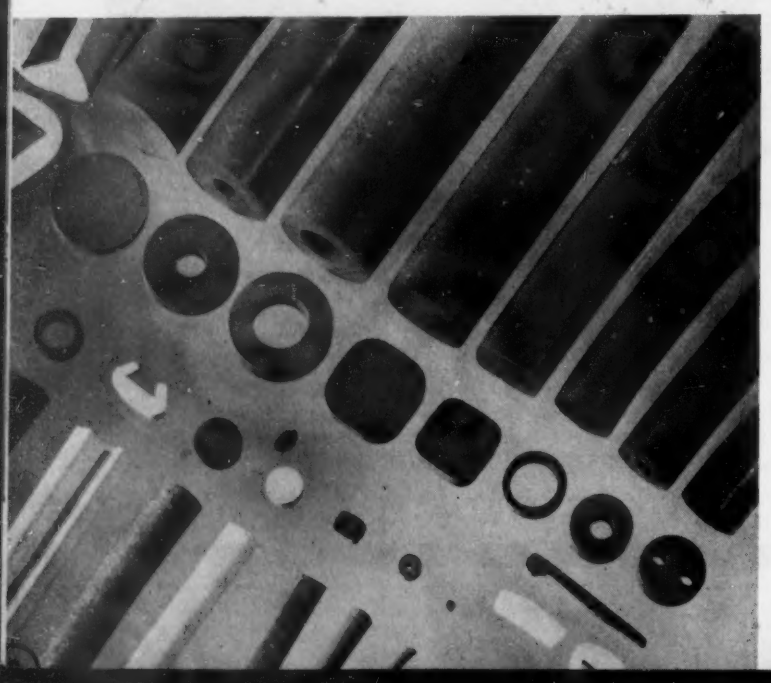

Fig. 3—Extruded tubes, rods and fabricated stock made of silicone rubber by General Electric

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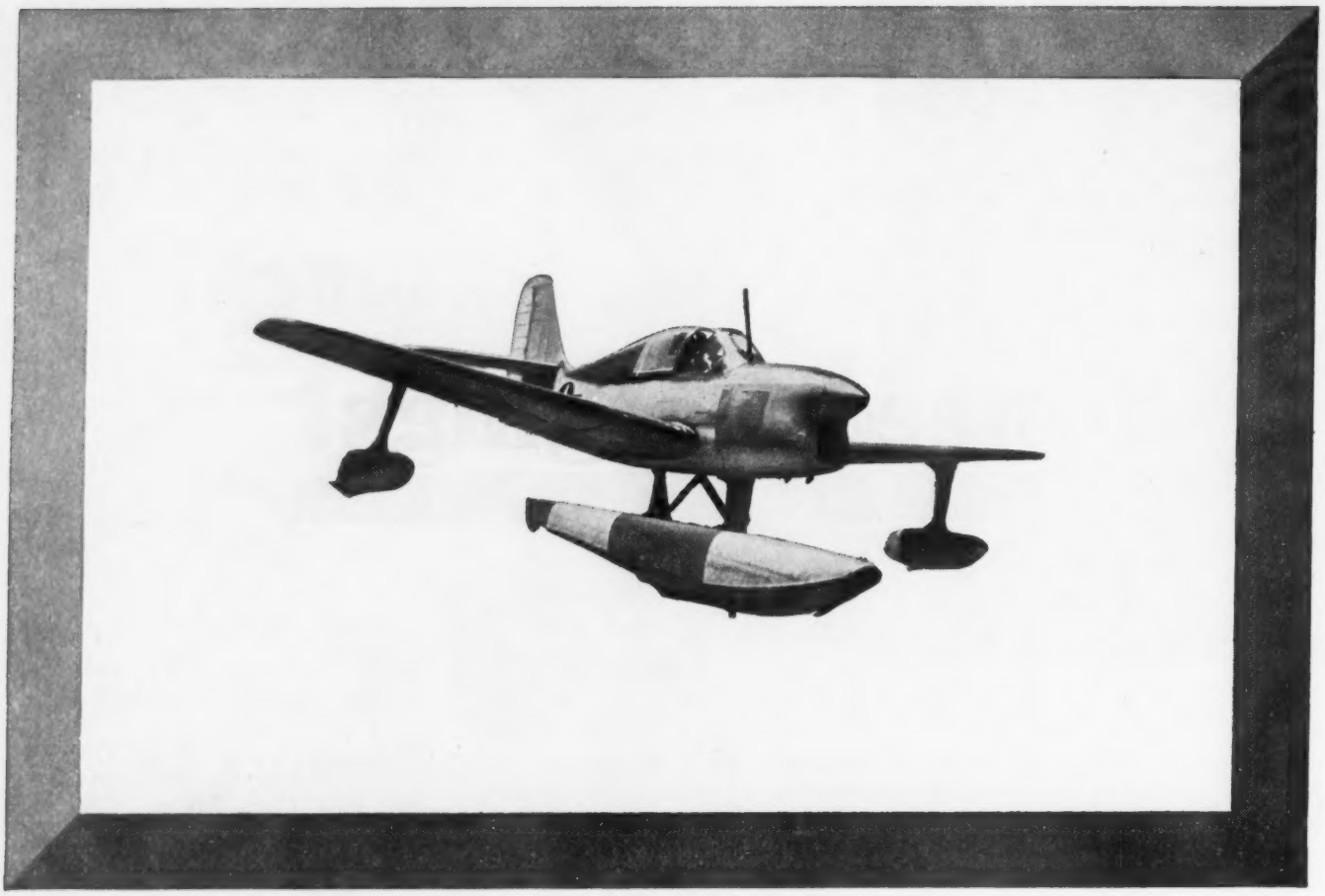

Warehouse steels helped make this picture

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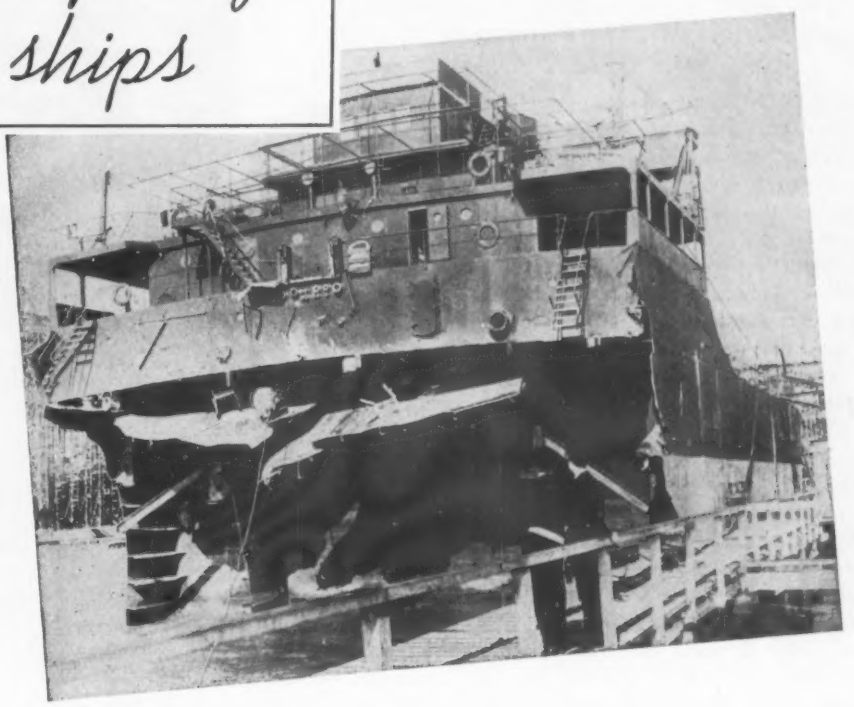
BIKINI TESTS prove strength of welded ships

Salvage of this tanker is said to have been possible because of rigid welded construction. Damaged stern was cut away and ship towed to port for repairs.



OPERATION Crossroads demonstrated important facts to industry as well as to the armed services concerning the art of joining metal to metal. In evidence of this, Lincoln Electric Co., Cleveland, cited a recent analysis of the underwater test at Bikini in the *New York Times*.

The article, by Hanson W. Baldwin, discussed the extensive underwater damage to the older cruisers compared to the light below-decks damage to the aircraft carrier, *Independence* in forecasting welded ship construction for the future. Emphasis on electric welded ships during the war was placed largely on the building speed and economy possible by this method. These ships made a remarkable record in their ability to withstand the violent impact of torpedoes, bombs and shells and in so doing, largely foretold the results of the tests at Bikini.

The famous aircraft carrier *Franklin* was able to return to an American base after undergoing savage attack to a degree that no war ship before had been able to take without sinking.

All stress parts of this rugged ship, according to Lincoln Electric, were welded. Wartime record of welded ships led the special committee investigating the national defense program to report that the most material departure from the method of constructing the original ship was in the use of electric welding. Adoption of assembly line methods and extensive prefabricating of parts also made possible the construction of a greater number of ships than had ever before been contemplated.

Safety Check for Compressed Air Hoses

A new safety device designed to eliminate danger of wildly whipping compressed air hoses is produced now by Hackett Mfg. Co., Oakland, Cal. The valve, called "Numatic Safety Check" is of simple construction involving a housing threaded at each end and a steel ball which rests, under normal pressure, at the bottom of a sloping sump at the compressor end of valve.

Excessive flow of air causes ball to roll up slope until it seals off port, shutting off air to line. When line is made air tight, bleed hole beside discharge port allows small amount of air to escape, thus equalizing pressure between air line and pressure tank. Ball drops away from port and rolls back down into sump when air pressure is nearly equal again.

According to the producer, the item is manufactured for working pressures up to 250 lb; it comes in standard 1/2 in. and 3/4 in. sizes.

New Uses Predicted For Spiral Tubing

Low cost light weight spiral tubing formed of ferrous and nonferrous metal strip may find uses as ready-made inexpensive concrete forms, mine ventilating shafts and portable irrigation systems.

With edges joined in a continuous 4-ply lock seam, tubing manufactured by Pratt Industries Inc., Frankfort, N. Y. is said to possess extreme rigidity. In recent tests seams withstood a pull of 2135 lb while 0.030-in. wall thickness tubing, stood on end, supported over a ton without measurable distortion.

Sap Sealed Wood Skids Protect Steel Surfaces

A specially compounded liquid that is said to seal moisture and acidic resinous sap in wood was perfected recently by Nox-Rust Chemical Corp., Chicago. New compound was developed as protection for steel surfaces against rusting and corroding action of exudations of green wood skids, separators, boxes, crates. Wood impregnation can be accomplished in matter of a few seconds to 24 hours, depending entirely upon the requirements that are set up by the user.

According to the manufacturer, effective laboratory and field tests under pressure up to 1400 lbs in 100 per cent relative humidity, at 120° F revealed no evidence of the new product coming off or leaving injurious deposits on steel.

WELDED *Wrought Iron "Channels"*

. . . used to cover spalled concrete spandrels on eight-story building

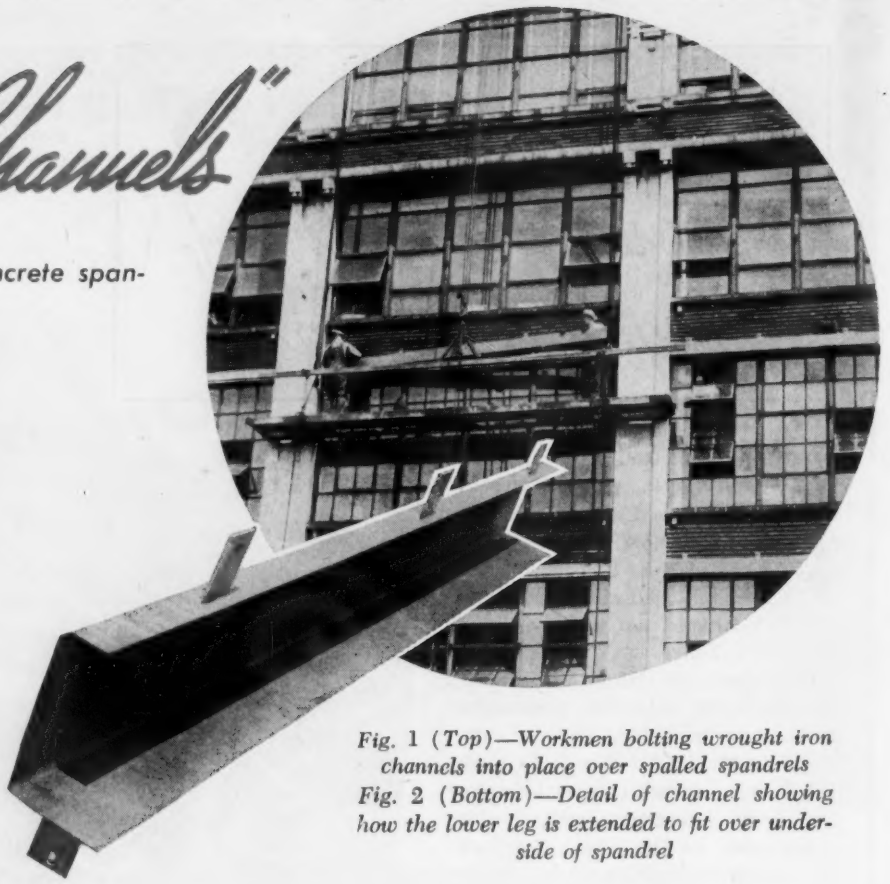


Fig. 1 (Top)—Workmen bolting wrought iron channels into place over spalled spandrels
Fig. 2 (Bottom)—Detail of channel showing how the lower leg is extended to fit over underside of spandrel

INSTALLING protective covers, fabricated of wrought iron plate by A. M. Byers Co., Pittsburgh, over spalled concrete spandrels is one of the latest techniques for this type of building maintenance.

Recalling how wrought iron plates are installed on submerged concrete piers and similar structural members subject to damage from water and ice, Milton C. Hartman, Chicago consulting engineer, designed "channels" of 3/16-in. wrought iron plate to cover spandrels of an eight-story building in Chicago. Mortar was chipped out over each spandrel to a depth of 1½-in. and the channels were slipped into place, well caulked and secured by expansion bolts.

Fabrication of the channels presented a problem because of the angle of the bend. It was decided, however, that the bend radius of 3/4-in. did not exceed wrought iron's maximum elongation of 14 per cent because the axis of the bend was at right angles to the direction in which plates were rolled at the mill.

Because the standard maximum width to which wrought iron plates are rolled is less than 8 ft 6 in.—the length of the spandrels—it was agreed that the channels could be fabricated of four lengths of 3/16-in. plate, each 55½-in. in length, welded together to the necessary overall length. The channels were cold bent so that the lower leg was 4½-in. wide, forming the underside. It was pitched slightly for drainage. The top leg, fitting over the top of the spandrel, was 1¾-in. wide, while the channel web was about 9¼-in. deep.

Besides dressing the exterior appearance of the building, this type of maintenance construction is said to provide additional structural strength.

Die Casting Bibliography Offered

A Bibliography of Statistical Quality Control, by Dr. Grant I. Butterbaugh; paper, 114 pages, 6 x 9 in.; published by the University of Washington Press, Seattle, for $1.50.

Increasing need for statistical quality control during the recent war gave impetus to training programs, both government-and industry-sponsored, in theory and practice of statistical methods. The author has compiled a list of articles, manuals, government bulletins, and books dealing with the specific subject of statistical quality-control methods for the purpose of facilitating its teaching and research.

Compiling a list of 712 articles, books, etc., Dr. Butterbaugh selected his sources from those published between 1924 through 1945. The selections appeared in 137 different periodicals, published in the United States, England, Canada and Australia.

The bibliography is divided into four parts, consisting of reviews of the pertinent literature from periodicals, pamphlets and manuals, and books, and providing an alphabetical list of authors with cross references to simplify locating the authors' publications. The reviews are concise, and in cases where the original copies of the publications were not obtainable for review, this fact has been noted, and, where possible, an abstract has been used.

Copper Tungsten Alloy Electrodes Announced

Main applications for new line of copper tungsten alloys manufactured by Ampco Metal Inc., Milwaukee, are for projection and flash welding, electrical upsetting and forging dies. Alloys in the line meet special conditions where electrodes are held over a fairly long priod at high heat and pressures, or where water cooling is not available. They are made in form of rods, bars and inserts.

Standard resistance welding electrodes may be secured with copper tungsten facing or on special spot welding tips, or flash and projection welding dies with copper tungsten inserts. Alloy meets Resistance Welding Manufacturers Association specifications and is available in a number of classes.

—o—

Developed especially for building up worn surfaces on shafting, pins and bushings, a new electrode developed by Champion Rivet Co., Cleveland, is said to deposit metal of good wearing quality that is readily machinable. Designated as Type C-30, the electrode eliminates the necessity of dismantling the entire assembly to replace worn parts.

One of the two wheels above was in use for four months on a charging machine where it was daily subjected to repeated loadings of 300,000 pounds. Previously, regular carbon steel wheels would mushroom and have to be taken out of service in two weeks, thus presenting an expensive maintenance problem involving three men to make the replacement. A heat treated wheel of Jalloy steel was substituted and after four months' service removed for inspection. It is the wheel on the right. No appreciable wear can be seen when compared to the wheel beside it that was never in service. If you have an application that requires resistance to abrasion, fatigue and high impact strength write to us about heat treated Jalloy.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

By WILSON G. HUBBELL
Chief of Metallurgical Section
Ryan Aeronautical Co.
San Diego, Calif.

Carbon Absorption

OF 18-8 AT HIGH TEMPERATURES

Metallurgical studies disclose that in spite of carbon pickup and the formation of structures containing precipitated carbides, intergranular corrosion does not occur nor is failure of parts due to these causes

STUDIES conducted by the engineering laboratory of the Ryan Aeronautical Co. disclose some interesting information in connection with the use of 18-8 stainless steel for high temperature exhaust applications. These experiments show: (1) That there is a carbon pick up in exhaust manifolds during their service life which varies with time, temperature and possibly type of fuel and (2) formation of the carbide network is not accompanied by any substantial intergranular corrosion.

It is well known that resistance to corrosion and oxidation of the basic 18-8 chromium-nickel stainless steels is attributable to the chromium which they contain in amounts of over 17 per cent and nickel which they contain in amounts of over 7 per cent. These elements account for the wide usefulness of the metal in industrial applications involving contact with a very large number of corrosive liquids and gases.

However, application of heat can cause a change in the micro-structure of the stainless steel which substantially reduces its corrosion resistance. This heat may be experienced in fabrication by welding or in service life where high temperature applications are involved.

One of the most exacting uses to which stainless steel has been put is in the structure of a modern aircraft exhaust manifold. These huge thin-walled, lightweight bodies channel the blast from multi-cylinder power plants. The steel from which they are constructed must be strong and corrosion resistant not only at ordinary temperatures, but under service conditions which may fluctuate rapidly from temperatures of minus 50° to 1700° F.

As a major producer of aircraft exhaust systems, Ryan Aeronautical Co. has had to meet the new problems which each increase in engine horsepower has presented. We, in the laboratory, have devoted a major portion of our efforts to metallurgical research devised to develop better stainless steel formulas for high temperature applications. In the course of this continual investigation, we studied the question of whether the stainless steel used in aircraft exhaust manifolds picks up carbon from the exhaust gases which might affect the

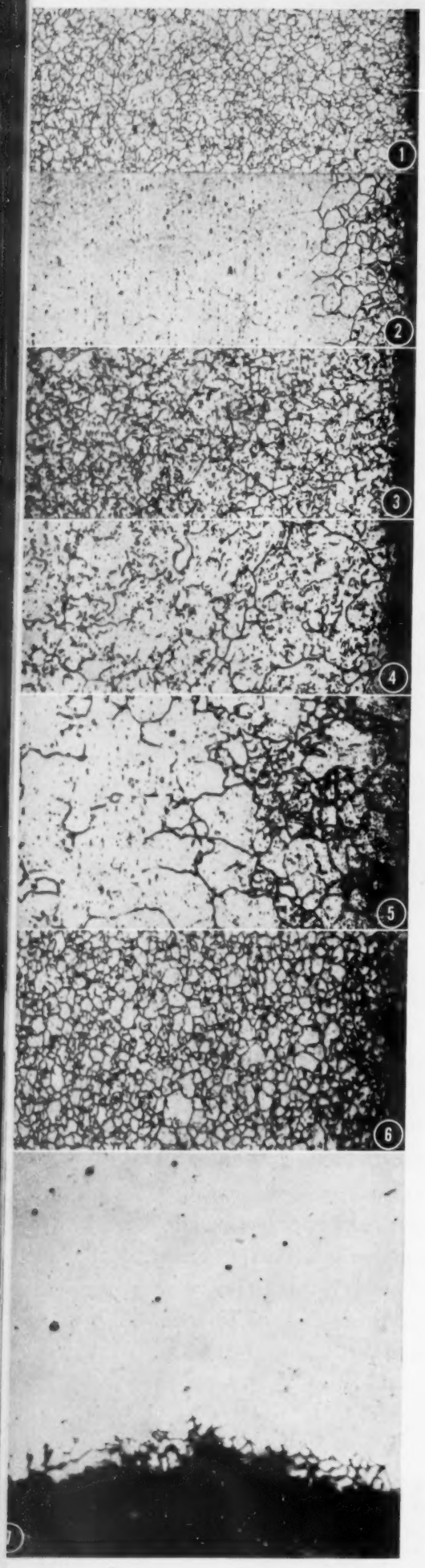
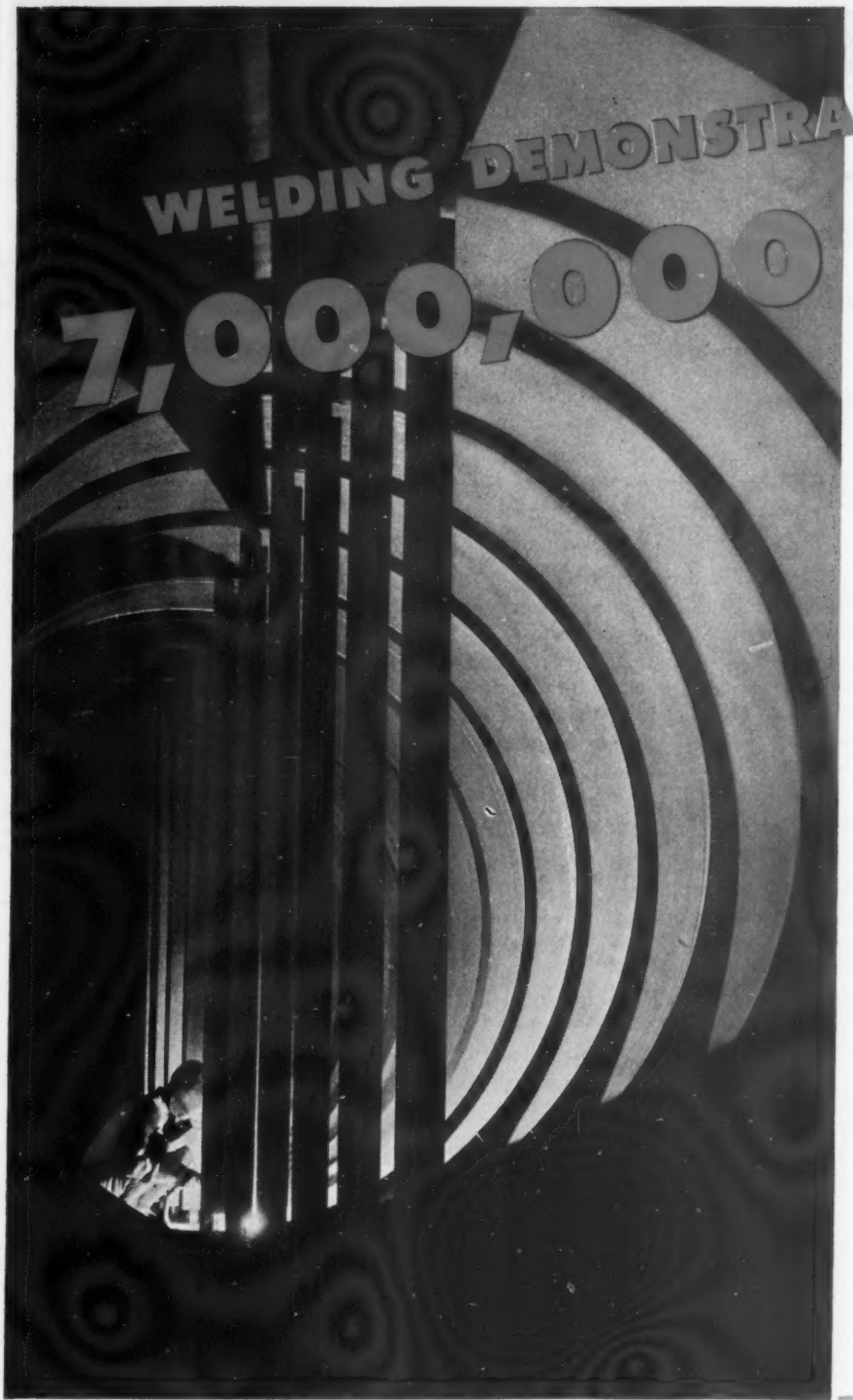


Fig. 1—Cross section of manifold No. 2 taken from hottest operating area showing complete penetration and heavy deposition of carbides
Fig. 2—Cross section of manifold No. 2 taken from coolest operating area showing partial penetration of carbon
Fig. 3—Cross section of manifold No. 3 taken from hottest operating area
Fig. 4—Cross section of manifold No. 3 taken from coolest operating area. No difference of carbon content was found to exist between the area of failure and the area opposite the failure
Fig. 5—Cross section of manifold No. 4 taken from hottest operating area indicates a heavier distribution of carbides penetrating through the section and an increase in grain size (See Fig. 6)
Fig. 6—Cross section of manifold No. 4 taken from coolest operating area shows a heavy penetration of carbides on the inside of the manifold body
Fig. 7—Cross section taken from the weld zone in the hottest area of manifold No. 2. It is unetched to show the presence of intergranular corrosion which progressed less than 0.005-in.



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CARBON CONTENTS OF AFFECTED AND UNAFFECTED REGIONS

MANIFOLD NO. 1—Burned out in a hot spot after 650 hr.	% C
Area of failure—analysis No 1	0.115
Area of failure—analysis No. 2	0.115
Opposite area of failure—analysis No. 1	0.9
Opposite area of failure—analysis No. 2	0.085
MANIFOLD NO. 2—In service 4000 hr without failure.	**% C**
Area of greatest absorption—analysis No. 1	0.107
Area of greatest absorption—analysis No. 2	0.105
Opposite area of greatest absorption—analysis No. 1	0.083
Opposite area of greatest absorption—analysis No. 2	0.080
Average pick up	0.024
MANIFOLD NO. 3—Burned out in a hot spot after 400 hr.	**% C**
Area of failure—analysis No. 1	0.105
Opposite area of failure—analysis No. 1	0.104
Average pick up	0.001
MANIFOLD NO. 4—Burned out in a hot spot after 725 hr.	**% C**
Area of failure—analysis No. 1	0.139
Opposite area of failure—analysis No. 2	0.073
Average pick up	0.066

(Electrolytic sodium cyanide etch was used to reveal the presence of carbides.)

corrosion resistance of the metal.

Theory behind this investigation concerns the vital role which carbon plays in the behavior of the 18-8 stainless steels. When chromium-nickel steels are held within the 800° to 1500° F temperature range for an appreciable time and then allowed to slowly cool, they lose a portion of their corrosion resistance. Theoretically, this is due to a changed microstructure in which the carbon separates out of solid solution and unites with the chromium to form a network of chromium carbides along the grain boundaries. This network presents a path for intergranular corrosion. How the corrosion actually progresses is a matter of several conflicting opinions.

Additions to columbium, in type 347 stainless steel and titanium in type 321, to the 18-8 formula are methods of preserving the steels' corrosion resistance through the critical temperature range. These stabilizing elements combine with the precipitated carbon and form harmless carbides which are well distributed throughout the steel and therefore cannot provide a path for intergranular corrosion. The higher the percentage of carbon which the steel contains, the greater will be the tendency to form harmful precipitated carbides. Also, the greater the percentage of the carbon content with respect to the sum of the chromium-nickel percentages, the more harmful will be the carbide precipitation. For example, a steel with a carbon content of 0.08 per cent and a chromium-nickel content of 25 per cent will form harmful carbides more rapidly than one with a carbon percentage of 0.08 and a chromium-nickel content of 27 per cent—other things being equal.

With these basic facts in mind, it becomes quite important to ascertain all of the conditions which might change the carbon content of stainless steels which rely heavily upon corrosion resistance, as in the case of the aircraft exhaust system structure. One suspected source of carbon pick-up available to the exhaust manifolds in actual service is the high temperature exhaust gases themselves. The Ryan Engineering Laboratory procured several exhaust manifolds which had failed in service and subjected them to a series of tests to determine whether carbon pick-up from exhaust gases contributed to their failure.

Two Different Sections Analyzed

Due to the impossibility of obtaining the heat number of the steel used in the manufacture of the manifold collector rings investigated, the carbon pick up was determined on a comparison basis by analyzing two different sections of a stamping in a given collector. The sections were selected from that part of the collector subjected to the most severe conditions, such as direct impingement of exhaust flames or poor cooling characteristics resulting in local hot spots, and that part of the manifold having the opposite in conditions, such as maximum coolness and remoteness from areas of direct exhaust impingement. The use of this method of determination by comparison could allow a carbon pick-up which would be greater than that reported because there is usually a slight pick-up in even the coolest sections of a collector stamping.

Photomicrographs and carbon analyses were made of each of the sections examined except manifold No. 1, which was not examined microscopically. The carbon analyses are as shown in accompanying table.

An examination of the photomicrographs made from the collector sections shows that there is a marked increase in the carbon content as you go from the coolest to the hottest zones, with one exception. Collector No. 3 shows no significant increase from one area to another but does show an increase in the total carbon content. Figs. 3 and 4 bear out the fact that the total carbon content is approximately the same in both areas and suggests that the section upon which the investigation was made had uniformly high temperatures on both areas from which the carbon samples and photomicrographs were taken. Fig. 6 of manifold No. 4 shows a heavy penetration of carbides on the inside of the manifold body while Fig. 5 indicates a heavier distribution penetrating through the section. Also, the grain size has increased tremendously, denoting very high temperatures.

Figs. 1 and 2 of manifold No. 2 show the same condition in which there is a complete penetration and a heavy deposition of carbides throughout the body of the manifold in the area nearest the hot spot and a partial penetration of carbon in the cooler area. Fig. 7 is a microsection of weld zone taken from manifold No. 2 in the hottest area. It is unetched and shows the presence of intergranular corrosion which has progressed less than 0.005-in.

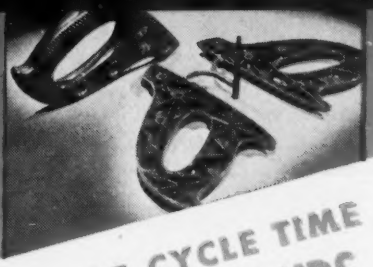
None of the photomicrographs examined revealed any intergranular corrosion, except that from manifold No. 2, in spite of the heavy carbide network which they exhibited.

Our conclusions from these investigations confirm our belief that there is a carbon pick-up in exhaust manifolds during their service life which varies considerably with time, temperature and possibly type of fuel. This pick-up varied from 0.023 to 0.06 per cent in the exhaust collectors which we examined. Although this carbon evidently contributes to the formation of a heavy network of carbides, as shown by the photomicrographs, the corrosion resistance of the stainless steel does not appear to be materially reduced. Manifold No. 2 did not fail in service even after 4000 hours and yet photomicrographs of Figs. 1 and 2 indicate an even carbide precipitation.

In manifolds No. 1, 3 and 4 there was no evidence of intergranular corrosion in spite of their failures. These manifolds failed because of excessive temperatures, due to poor cooling conditions, which produced scaling of the metal. This type of failure is becoming more prevalent with the trend toward higher operating temperatures which higher horsepower engines are imposing.

There has been considerable speculation on the cause of some aircraft exhaust manifold failures. Most investigators in the field, not acquainted with the phenomenon of carbon pick-up from exhaust gases, have attributed these failures to the presence of the precipitated carbides. Most photomicrographs taken from exhaust systems which have been in service for relatively short periods will show this carbide network.

In all of the cases where we have



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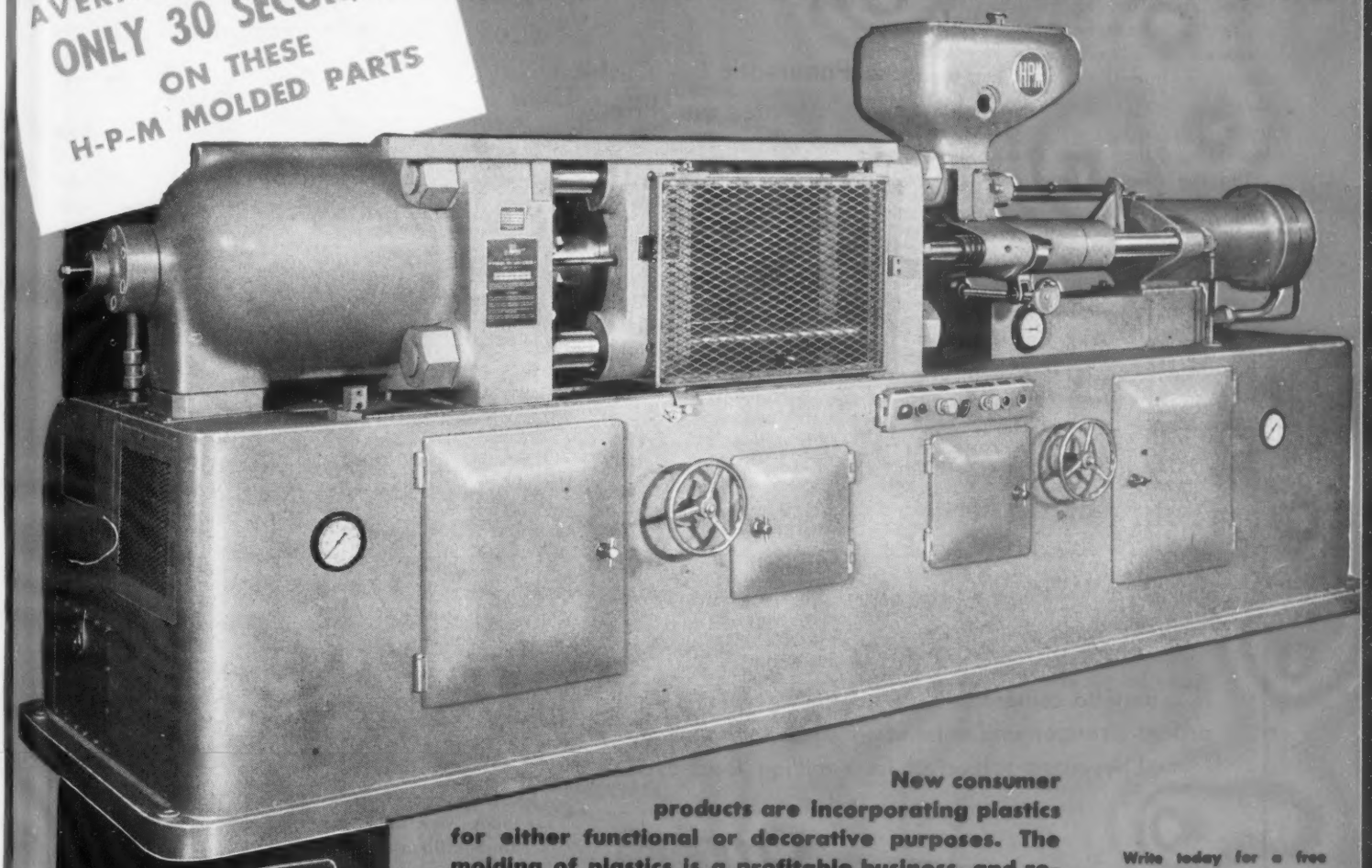

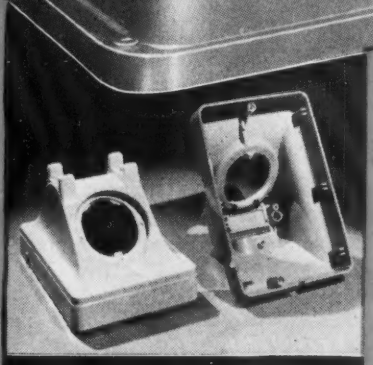

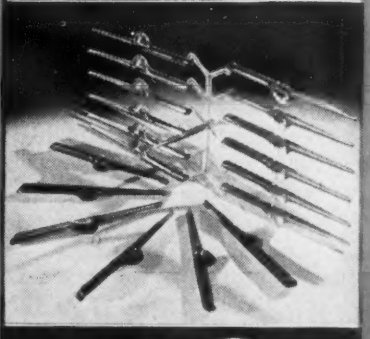

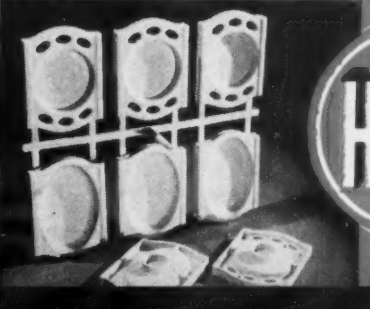

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checked the investigations made in the field, these failures have been due to design considerations or excessive temperatures and not to the presence of precipitated carbides and intergranular corrosion.

Why the carbide network formed from picked up carbon in exhaust manifolds is not accompanied by intergranular corrosion is a question which should deserve additional study. It may be that these carbides, formed over extended periods at relatively low temperatures, are less harmful than those formed suddenly as in the case of sensitized type 302 stainless steel.

Another theory which we have been considering in the Ryan laboratory is that there might be some progressive intergranular attack which keeps pace with the build up of carbides in the exhaust manifold but which is removed as rapidly as it occurs by the rush of high velocity exhaust gases which scour the surface. The fact that most of the interiors of these manifolds present, in relief, the type of wearing away called erosion seems to give credence to this theory. Several cases in which exhaust systems have worn to almost paper thinness without failure have been found.

The solution to these problems will come from metallurgical research which will uncover new materials capable of greater performance at extreme temperatures.

Pneumatic Die Cushion Operates on Shop Air

A pneumatic die cushion which may be mounted directly to the bottom of bolster plate of punch press by the drilling of four holes to receive supporting rods utilizes a bellows type construction. Said to lose no air pressure after cushion is charged from shop air line to a predetermined pressure, this pressure can be maintained over entire run on a given part.

According to the manufacturer, Dayton Rogers Mfg. Co., Minneapolis, the synthetic bellows lends itself to the design that it automatically sheds the cushion unit so that no pierced slugs or other parts come in contact with any of the cushion unit's working parts. Unit can be provided for press bed mounting, allowing operator to remove bolster plate without disturbing cushion installation.

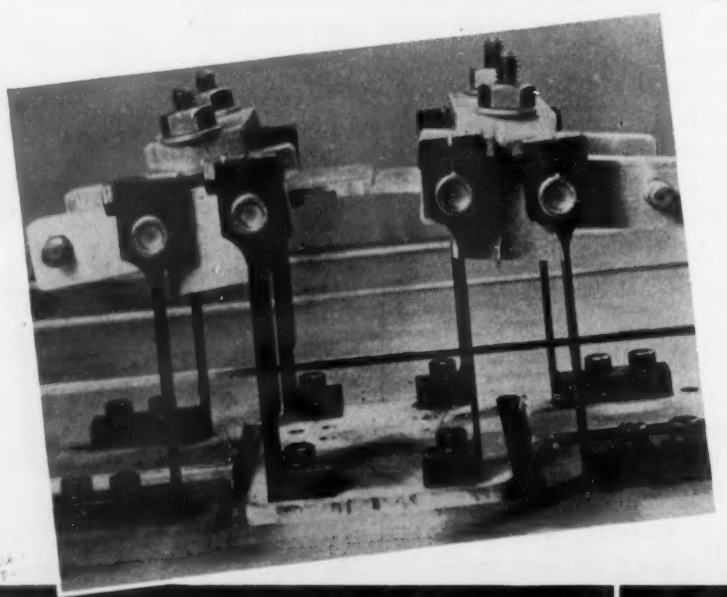
Booklet Describes Descaling Equipment

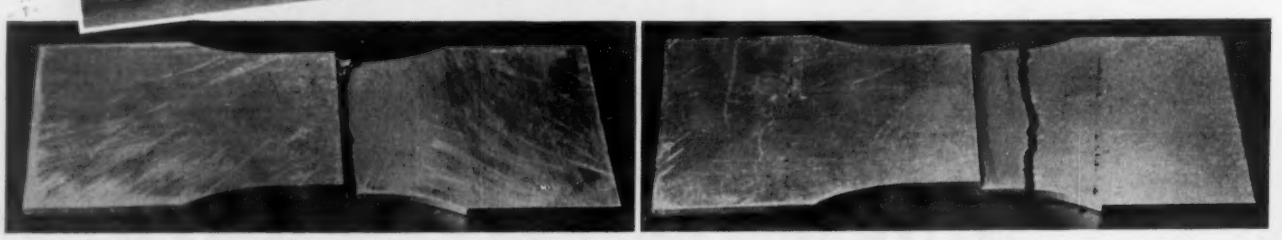
Report summarizing wartime research on the use of boron in steel alloys conducted by Battelle Memorial Institute, Columbus, O., under direction of War Metallurgy Committee of National Defense Research Committee, is now for sale by Office of Technical Services, Department of Commerce, Washington. Containing comprehensive descriptions of testing methods and results as well as tables, graphs, and photographs, the report gives results of 100 boron-treated steels.

The report, written by M. C. Udy and P. C. Rosenthal, is designated as PB-16076, and costs $5 for the photostated edition and $1 for the microfilm edition.

PLASTIC ADHESIVE

. . . used to cement two pieces of duraluminum together proves stronger under bending stresses than metal itself. Specimens subjected to 5 million load cycles





FATIGUE tests recently given two pieces of 1/16-in. thick duraluminum cemented together with a new plastic adhesive showed that the adhesive actually is stronger under bending stresses than is the metal itself. The tests were conducted by the Sonntag Scientific Corp. as a part of a series of tests conducted for the ASTM.

Fifteen specimens of the 24ST aluminum alloy were used. Repeated alternating loads up to 5 million load cycles were applied to the specimens and in all cases except one the adhesive held while the metal itself fractured. The adhesive parted in only one of the tests. Photo at the left is the universal fatigue testing machine of Baldwin Locomotive Works, showing the cemented pieces of duraluminum in the fixture. Lower photo shows how adhesive held while the metal fractured.

These tests, simulating actual service, indicate that it may be possible to use the adhesive to glue aircraft parts together. This could materially reduce the surface drag of airplane wings and fuselage.

The adhesives tested were Cycleweld, a product of Chrysler Corp. and Redux, made by the Resinous Products & Chemical Co. of Philadelphia. It is understood these adhesives are chemically very similar.

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Above: Receding die for Pipe Machinery Company threading machine. Vital castings Meehanite.

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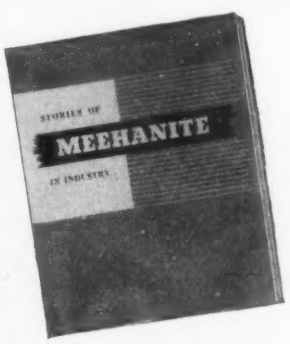

Write for our Bulletin No. 22 "Stories of Meehanite in Industry."

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VARIABLE VOLTAGE

By Z. W. WHITEHOUSE
Supt. of Electrical Maintenance
Republic Steel Corp.
Canton, O.
and
A. F. KENYON
Industrial Engineer
Westinghouse Electric Corp.
East Pittsburgh, Pa.

SINCE 1917, the 35-in. reversing blooming mill at the Canton plant of the Republic Steel Corp. has been in continuous service. During this period it has rolled more than 11,200,000 tons of ingots. The original front and back main tables were of relatively light construction with open spur and bevel gear drives; after 25 years of operation they required excessive maintenance to keep them in running order. Also the mill was being requested to roll larger ingots, with resulting more severe service on the tables and other handling equipment. Therefore as part of a modernization program, complete new front and back main tables and feed rolls, manipulator, and sideguards have been installed. Variable-voltage drives, with Rototrol control, were selected for the tables and feed rolls. Fig. 1 is a view of the mill, looking at the entry side, and showing the heavy construction of the enclosed reduction gear, and layshaft and bevel gear drive to the different table rolls.

Entry and delivery tables each consist of 21 solid steel rolls, 16 in. diameter and 88½ in. long, spaced 27 in. from center to center. The total overall ratio of the bevel gear between the layshaft and rolls and the double reduction gear between the motors and the layshaft, is 4.33:1. Each table is driven by two frame MC-18, 150 hp, 230 v, 460 rpm, shunt-wound, direct-curent mill motors. Rated motor speed of 460 rpm thus corresponds to 445 fpm table speed. The total WR^2 of each table, referred to the motor shaft, is approximately 2800 psf, of which 30 per cent is represented by the two motor armatures and 70 per cent by the couplings, reduction gearing, bevel gearing, together with table rolls.

Built into the mill housing, are two feed rolls on both the entry and delivery sides of the mill. Each pair of feed rolls is driven by a frame MC-14, 75 hp, 230 v, 515 rpm, shunt-wound, direct-current mill motor. The feed rolls are 16 in. diameter and 88½ in. long; overall gear ratio between the rolls and motor is 4.05:1, so that 515 rpm rated motor speed corresponds to 535 fpm feed roll speed. The total WR^2, referred to the motor shaft, is approximately 375 psf, of which 28 per cent is represented by the motor armature and 72 per cent by the coupling, gear drive, and feed rolls.

Variable-voltage auxiliary drives for some blooming mills have been arranged with the entry feed rolls motor and entry table motors supplied from one generator, and the delivery feed rolls motor and delivery tables motors supplied from a second generator. However, Republic

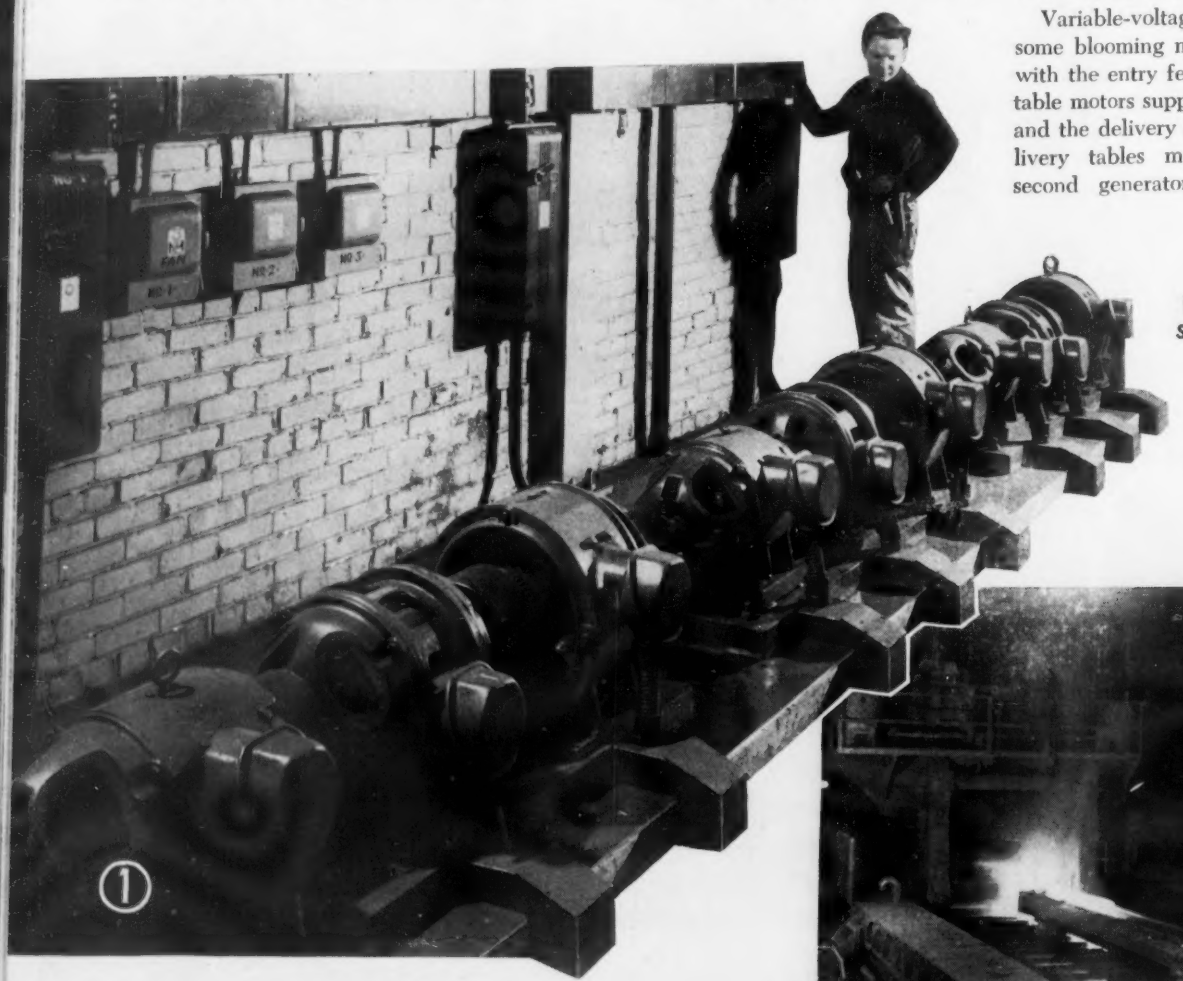


Fig. 1—High running speed for tables and feed rolls is assured by these rotating regulators

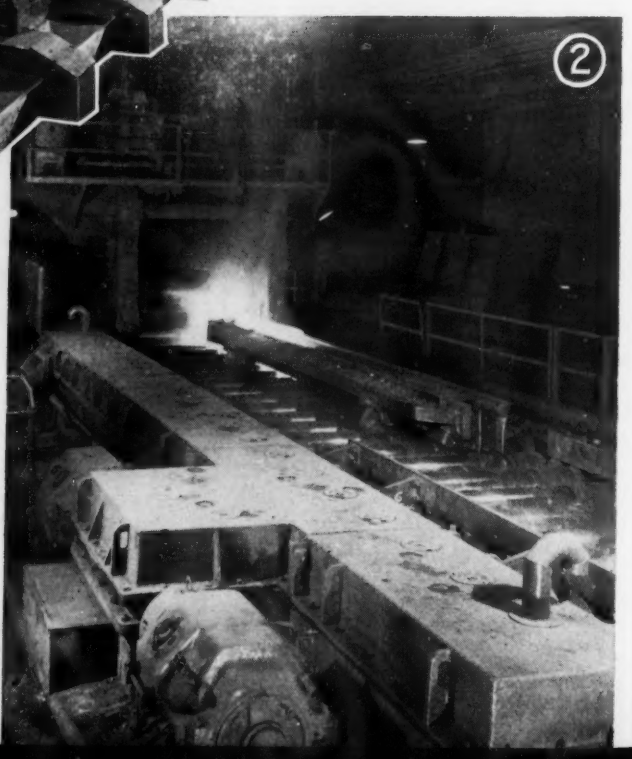


Fig. 2—Entry side of 35-in. reversing blooming mill

DRIVES

for Blooming Mill Tables and Feed Rolls

Separate generators have "shovel" characteristics which provides a high running speed for tables and feed rolls and affords protection against overloading. Provision is made for necessary repairs and maintenance. First application of totaling control for this type of service

had had experience with the variable-voltage table and feed roll drives on the 44 in. blooming mill at the Cleveland plant, which indicated that with the feed rolls and table motors supplied from the same generator, the feed rolls could be jammed and excessive currents drawn by the relatively small feed rolls motor without imposing sufficient total load on the large 3-field shovel generator to reduce its voltage and limit the jamming current. The rearrangement of the Cleveland mill to supply the feed rolls motors from separate generators greatly improved the operation, as by proportioning the characteristics of the 3-field shovel generators to match the rating of the feed rolls motors, the drives were afforded complete jamming protection, with lessened electrical and mechanical stresses and reduced maintenance. With this experience as a guide, it was decided to provide a separate generator for each of the entry table, entry feed rolls, delivery feed rolls, and delivery table drives of the Canton 35-in. blooming mill.

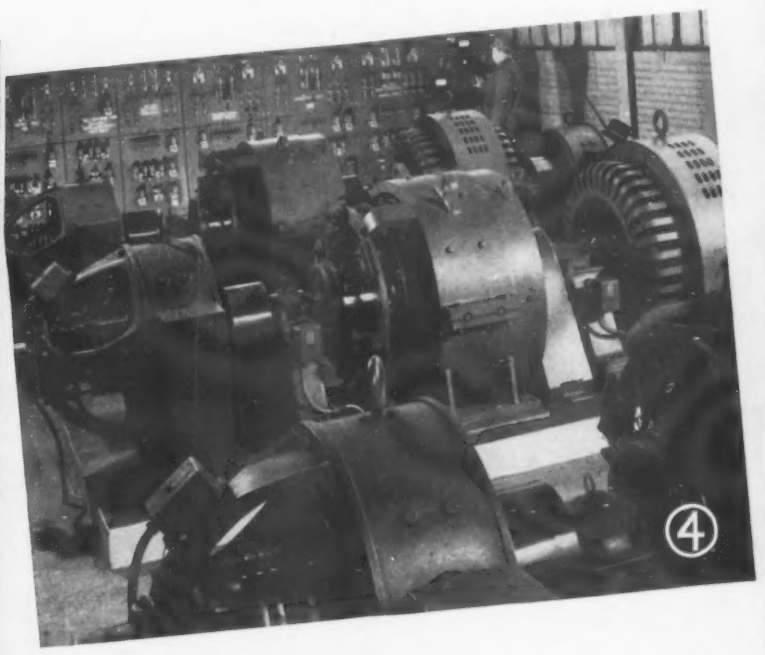
Assuming 30 in. normal diameter of the mill rolls, and 100 rpm maximum roll speed, the mill speed may range up to nearly 800 fpm. As indicated previously with rated motor speeds the main tables will operate at 445 fpm, and the feed rolls will operate about 20 per cent faster or 535 fpm. Each main table is driven by two motors with the armature connected in series, so the table generators are made capable of developing 600 v maximum to supply normal voltage to each of the table motors. Each pair of feed rolls is driven by a single motor, so that the feed rolls generators are made capable of developing only 300 v maximum. Principally rolling alloy steels, the Canton mill is not required to operate at the high speeds and rapid acceleration essential on a mill producing mild steel, so that the control has been adjusted to provide about 480 v maximum on the entry and delivery main tables, and about 220 v maximum on the feeds rolls drives.

Capacity of the 75-hp motor driving two feed rolls is comparatively much larger than the capacity of the two 150-hp motors driving 21 table rolls. However this liberal capacity of the feed rolls drives is necessary as they are jammed more frequently and subjected to more severe shocks than the table drives. It is to be noted that the full load torque of the two 150-hp motors will accelerate the tables at the rate of 365 fpm per sec, while the full load torque of the 75-hp motor will accelerate the feed rolls at 650 fpm per sec. Thus the feed rolls tend to accelerate and decelerate more rapidly than the tables, as well as to operate at slightly higher maximum speed.

Fig. 6 shows the schematic arrangement of the variable-voltage equipment for the tables and feed rolls, and Fig. 7 shows the installation of the variable-voltage control panels and motor-generator sets. It is essential that the tables and feed rolls operate without interruption, hence there is installed a spare motor-generator set, associated spare control panels and Rototrol regulating exciter set. Normally the entry table and entry feed rolls are operated from the 50 kw and 150-kw generators, respectively, of the No. 1 set; the delivery table and delivery feed rolls are operated from the corresponding generators of the No. 3 set; and the No. 2 main set and No. 2 Rototrol set are not used and may be shut down. Transfer knife switches are

Fig. 3—Double-armature, 5000-hp, reversing motor which has been in continuous service for nearly 30 years driving 35-in. blooming mill

Fig. 4—Three variable-voltage M-G sets which provide uninterrupted service of tables and feed rolls



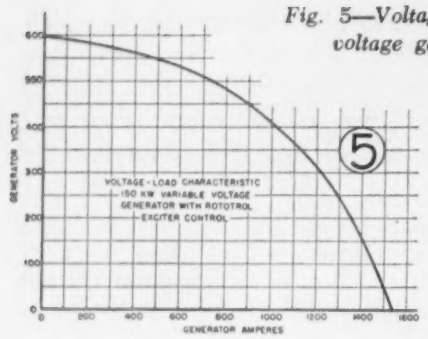


Fig. 5—Voltage-load characteristic curve for variable-voltage generator with Rototrol exciter control

provided on the control panels so that when necessary the feed rolls or table motor(s) may be transferred to the spare equipment, and the regular generator, control panel, and Rototrol exciter taken out of service for any necessary repair or maintenance. Either of the two 40-kw constant potential exciters is capable of supplying the entire excitation and control load, so that only one exciter need be used, or the two exciters may be operated in parallel.

Provision also is made so that the mill screwdown can be operated from the spare 150-kw variable-voltage generator, control panel, and Rototrol exciter, or when they are required for the entry or delivery table, the screwdown may be operated from the old magnetic resistance controller.

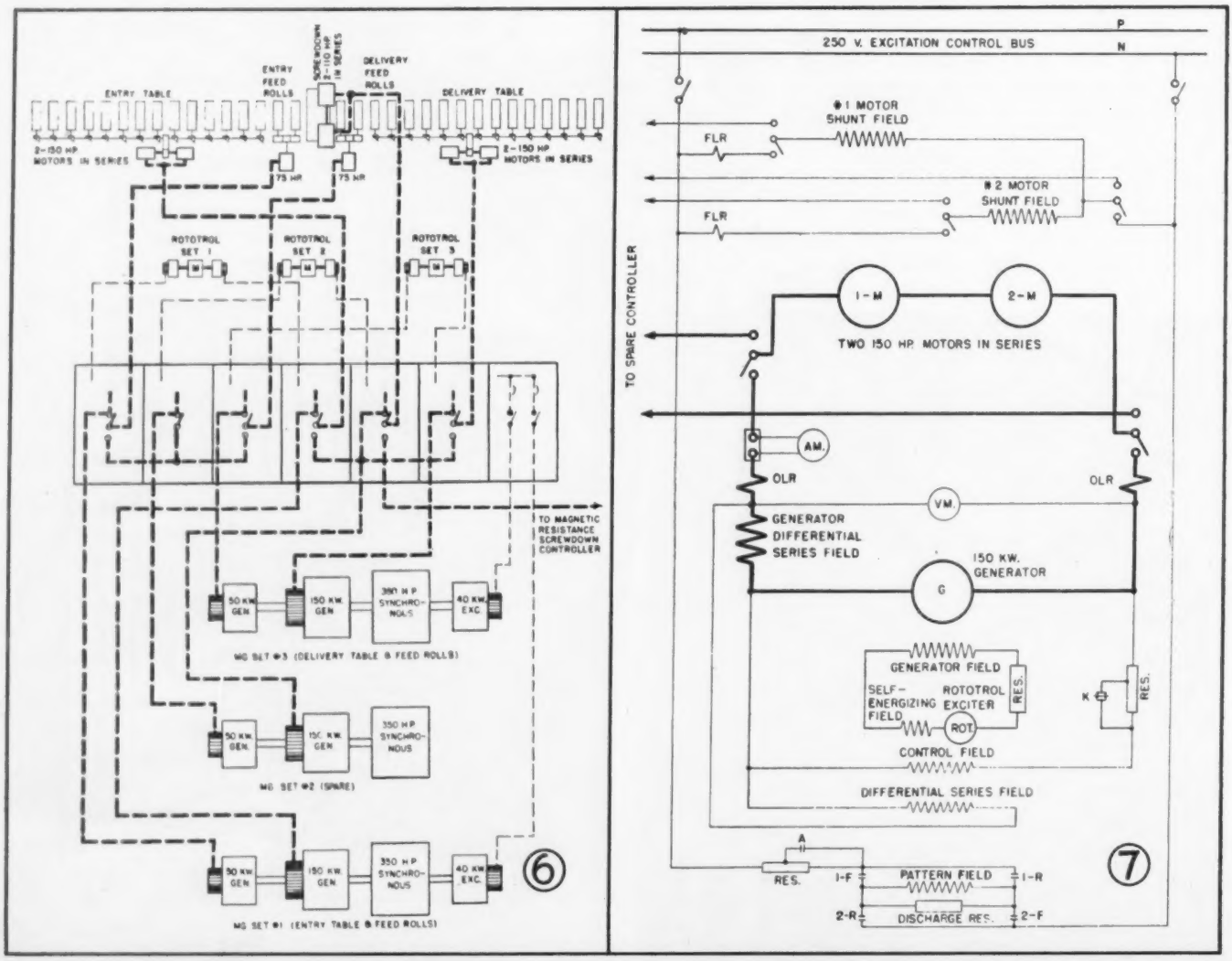
The Nos. 1 and 3 motor-generator sets each consist of a 350-hp, 0.8-power factor, 300 per cent pullout torque, 2200-v, 3-phase, 60-cycle, 1200 rpm, synchronous driving motor; 40-kw, 250, self excited, constant potential exciter; 150-kw variable-voltage generator to supply power to two 150-hp table motors; and 50-kw variable-voltage generator to supply power to one 75-hp feed rolls motor. The No. 2 spare motor generator set is identical except that it consists of only the driving motor and two variable-voltage generators and does not include the exciter.

The variable-voltage generators are made with separately excited shunt and differential series field windings so that in combination with the Rototrol regulating exciter they have the so-called "shovel" characteristic by which they generate a high no-load voltage which is well maintained at loads up to 150 per cent, but which is reduced to nearly zero at about 250 per cent current by the action of the differential series field. This characteristic provides a high running speed for the tables and feed rolls, and also definitely limits the maximum current and torque and affords protection against overloading the electrical and mechanical equipment. The table generators are rated nominally at 150 kw, 250 v, 600 amp, but are designed to develop 600 v maximum at no-load, and 60 v (equal to the IR drop in the motor circuit) at 1500 amp stalled current. This voltage-load characteristic is shown by the curve of Fig. 5. The feed rolls generators are rated nominally at 50 kw, 150 v, 333 amp, and are designed to develop 300 v, maximum at no-load, and 30 v at 750 amp stalled current, with voltage-load characteristic curve shape similar to that shown for the 150-kw table generator.

Armature and field connections for one of the table drives are shown schematically in Fig. 7. The two table motor armatures, in series, are connected

Fig. 6—Schematic arrangement of equipment for blooming mill tables and feed rolls showing generators and Rototrols

Fig. 7—Diagram of connections for variable-voltage blooming mill table drive



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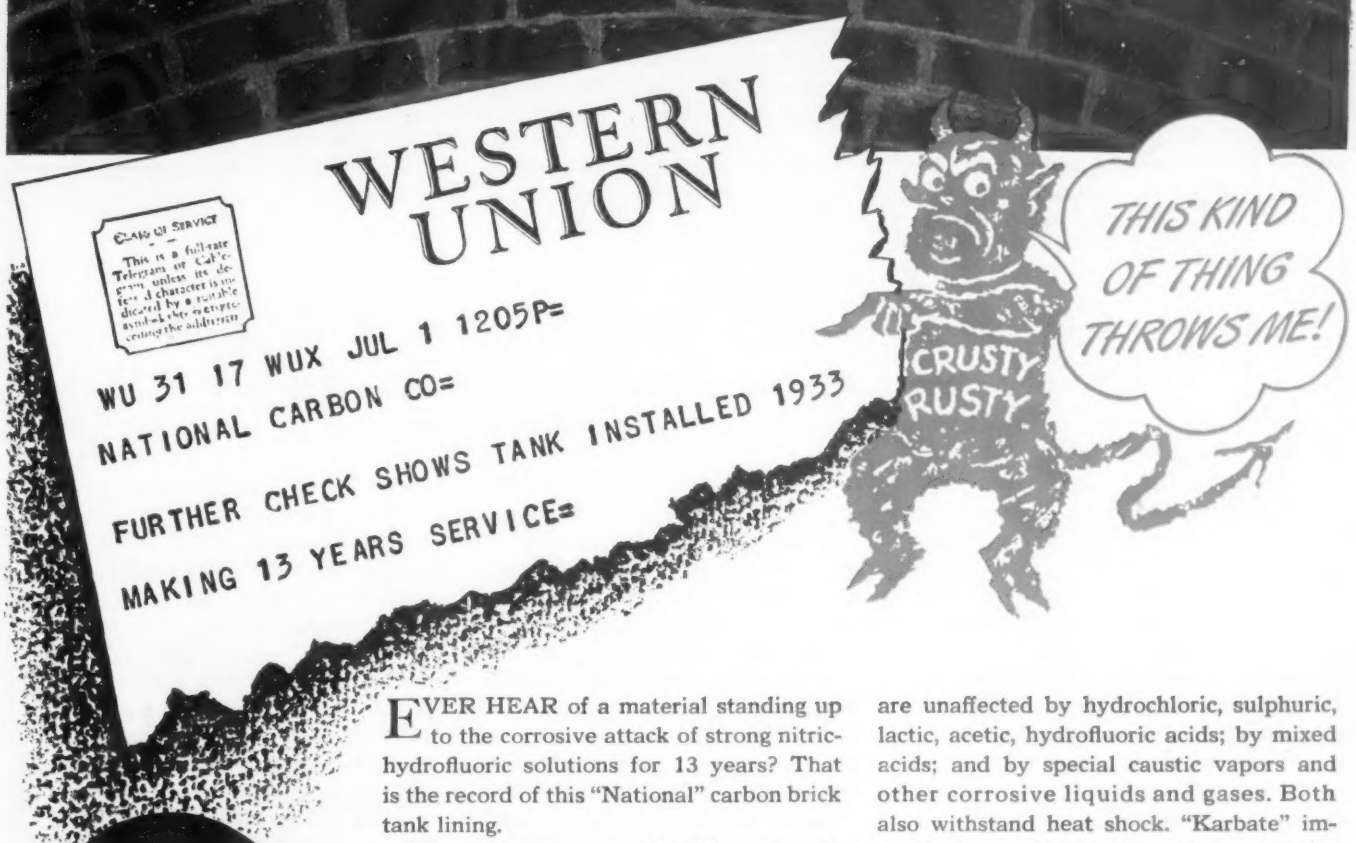
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directly to the variable-voltage generator. The motors are separately excited from the 250-v constant potential bus, and operate with fixed excitation so that the motor speed is almost directly proportional to the generator voltage. The generator has a main shunt field winding which is excited entirely by the Rototrol regulating exciter, and also a light differential series field winding to assure stability and provide some droop in the inherent voltage-load characteristic. The Rototrol regulating exciter is of usual standard construction for small direct-current machines, and its special forcing and regulating characteristics are obtained by virtue of the several interacting field windings.

Of particular importance is the series self-energizing field, connected in the Rototrol armature circuit. By adjusting the resistance of this circuit, the Rototrol may be "tuned" so that the self-energizing field will provide practically the total net excitation required and will sustain the voltage at any point along the straight-line portion of the saturation curve. Then a relatively small change in the excitation supplied by the other fields may produce a large change in the Rototrol output and hence of the main generator. The pattern field is excited from the 250-v constant potential bus, through a resistor and forward contactors 1-F and 2-F, as shown in Fig. 7, or reverse contactors 1-R and 2-R. The control field is excited from the 150-kw generator output voltage, and this field is connected differentially with respect to the pattern field. Thus when starting from standstill or reversing from the opposite direction the pattern field provides an excess of excitation to force the generator field and obtain rapid acceleration. Then when the generator voltage reaches normal, the pattern and control fields balance each other and the Rototrol output is sustained by the self-energizing field.

The contactor A (Fig. 7) is open on the first point of the master switch and closed on the second point to provide a measure of speed and acceleration control. The contactor K is open during normal running but is closed when the masterswitch is centered to assure rapid deceleration to standstill and to neutralize the generator residual voltage and thus prevent "creeping". The Rototrol differential series field is excited from the voltage drop in the generator differential series field, and this field is connected cumulatively with respect to the control field and differentially with respect to the pattern field, so that as the generator output current increases the Rototrol regulates for a lower voltage. With proper relative adjustment of the pattern, control, and differential series fields, the generator voltage is reduced to a low value just equal to the IR drop in the motor circuit at about 250 per cent of rated full load current, and the equipment is thus protected against excessive loads. This characteristic of the variable-voltage equipment is particularly advantageous on the feed rolls drives as they may be jammed and stalled by an ingot turning down heavily against these rolls.

Operation of the blooming mill is controlled from an operator's pulpit, located over the delivery table. The entry table, entry feed rolls, delivery feed rolls, and delivery table are all controlled together from one reversing mill master switch, with two auxiliary foot operated cutout pushbuttons by which either the entry table and feed rolls or delivery table and feed rolls may be disconnected and the other side operated alone.

Treatment of DRAWING COMPOUNDS

Additions of sulphur, antioxidants, polar compounds and inert organic materials impart specific qualities to drawing compounds

THERE is evidence that some mystery exists in plants using drawing compounds, as to the purpose of various treatment given to straight oil to enable it to perform successfully in drawing operations. While types of treatments (sulphur, pigment, etc.) may be familiar, added qualities imparted by each treatment are explained in following paragraphs by engineers of E. F. Houghton Co., Philadelphia.

That *sulphur* is a much used additive is a well known fact because it has been well publicized. The fact does not generally appear, except in technical articles, that sulphur is an antiweld additive which tends to eliminate the welding of thousands of microscopic metallic particles to each other.

Heat resulting from the plastic deformation of the metal may be sufficient to cause welding with resultant poor work surfaces in the finished job. Any additive which lowers the tendency to weld, performs a vital function in a drawing compound.

In untreated oils, lubricity of the compound may be insufficient to carry the pressure built up between dies and work. Although lubrication is not the only purpose of a compound, it is one of its major functions. For lubrication, a large quantity of oil having low film strength does not equal in performance a much smaller quantity having a higher film strength. Although high film strength is not required for all types of drawing—brass being an outstanding example—in many cases it is a requisite. The term "extreme pressure treatment" is applied to the process which builds up the film strength to the degree required.

Anti-oxidants usually included among components of modern drawing compounds are directly for the benefit of workers. They are added to prevent rancidity and bacterial growth in the compounds. Unchecked, these conditions can be not only nauseating but also a health menance.

While the need for lubrication is universally recognized, it is likewise an accepted fact that such lubrication must be controlled, that is, possess a certain amount of drag. Zero friction in drawing is not desirable. Also, at times the film of the lubricant ruptures. *Pigmentation* by means of inert organic materials enables a compound to maintain the degree of control necessary in its lubrication function and to interpose some material between sliding metal surfaces in the event of an oil film rupture.

Last among the major treatments given to drawing compounds is the addition of *polar compounds.* While these have no great effect on the film strength, they do form a fixed molecular film which is more highly resistant to removal than that of straight petroleum derivatives.

All of these treatments may not be necessary for every compound, but to know which are needed and in what proportions, is of utmost importance.

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Can Makers to be charged for imperfect work, at the rate of 72 cts. per doz. for 1 lb. and 96 cts. per doz. for Corn and other sizes.
One months pay to be kept back to cover imperfect work.
Concern to furnish Coal, Coppers, pile the Cans and cut them out.
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Jan. 14, 1875.
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Three-quarters of a century ago can makers were penalized severely for faulty work, as this actual poster reproduction shows. Years of can-making progress and development of automatic machinery have changed things. So efficient is today's can making machinery that testing for weak seams, incorrect soldering, misplaced droplets of sealing compound, etc., rejects on an average of only 3.15 cans per thousand. After one end is sealed on, the cans go to the testing machine which, by means of air pressure, tests them for leaks and automatically discards any that are faulty.

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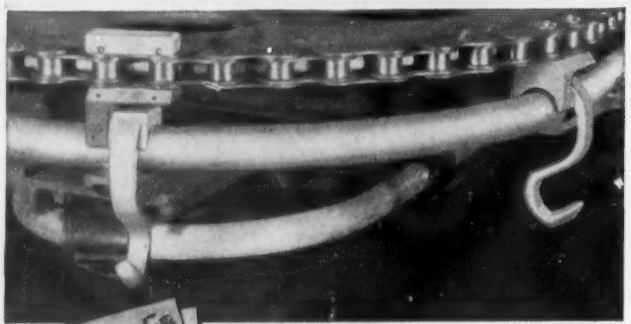

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Vertical Spindle Grinder

A direct drive double verticle spindle grinder, immediate right, which features a horizontal rotary feed that enables operator to drop small parts into the feed wheel rapidly and accurately, is announced by Charles H. Besly & Co., 118-124 North Clinton street, Chicago 6. The machine, listed as No. 902, is designed to speed grinding of steel rollers, carbon brushes, washers and other small parts. Two 1 hp, 1800 rpm motors drive the bolted-on abrasive disks which measure 12 in. in diameter with a 4 in. diameter hole.

Steel 12/30/46; *Item No.* 9043

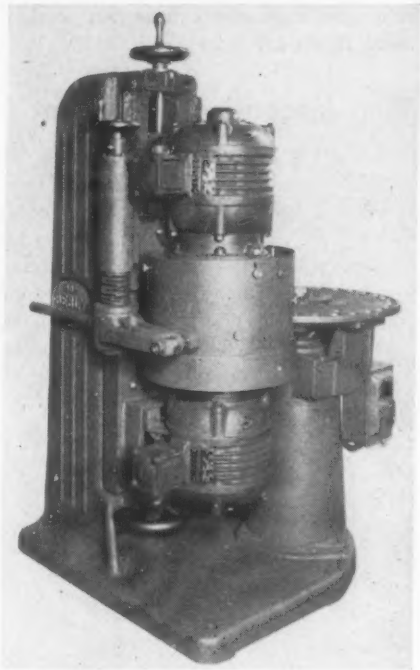
Coil Truck

Strip or wire coils, box strapping, wheels, tires, lathe chucks and face plates are handled easily and rapidly by this new coil truck, left below, marketed by Sabin Machine Co., 6536 Carnegie avenue, Cleveland 3. An adjustable arm passes through the center of the product as the truck is pushed forward. A pull on the handle lifts the load and balances it over the truck's wheels. Articles stacked against a wall do not have to be touched by the trucker. Lifting fork is adjustable to height of hole in load to be handled.

Steel 12/30/46; *Item No.* 9047

Thermostat

Highly responsive adjustable, precalibrated bimetal Type S thermostat announced by Stevens Mfg. Co., Mansfield, O., is designed for applications requiring close temperature control. Its independent bimetal strip actuates the stainless steel or Inconel contact springs, and since the



bimetal carries no operating current, inductive heating of the element is eliminated. Heavy-duty silver contacts are spot welded to contact springs. Units can be supplied with either lava or mica insulation. Supplied with either standard or elevated terminals, it has a heating capacity of 15 amp, 115 v ac.

Steel 12/30/46; *Item No.* 9889

Portable Crane

A folding portable crane illustrated below, designed so that the upper part may be folded down to permit moving it under low doorways or other overhead obstructions, is being manufactured by Revolvator Co., North Bergen, N. J. Folding is effected by the same crank and cable that is used for hoisting. With crane in folded position, it is raised into position by turning the crank, final positioning being done by placing inserting pins through stationary and movable frames. Crane is equipped with low gear for lifting very heavy loads, its maximum capacity being 4000 lb. It is equipped with floor lock and steering handle.

Steel 12/30/46; *Item No.* 9044

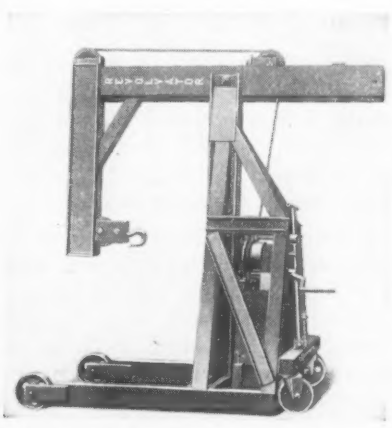
Air-Hydraulic Press

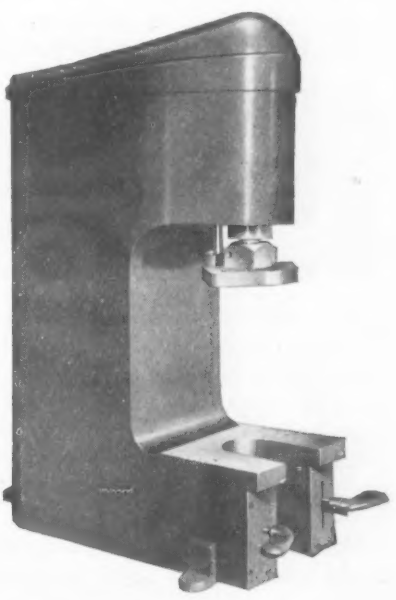
Designed as a complete unit for use on a bench this 5-ton air-hydraulic press, directly below, manufactured by Bryant Products Co., Jackson, Mich., is equipped with a 4-way balanced valve for easy operation and control. All working parts are contained in the housing. Press is operated by air from any air line of no required pressure. It is capable of performing straightening, broaching, stamping, riveting, forming, bending and various punching operations. Synthetic rubber O ring is used to largely eliminate friction. Inside surfaces of air cylinder are chromium plated.

Steel 12/30/46; *Item No.* 9039

Split Pillow Blocks

Quick and easy installation, removal and replacement of the shaft without misalignment and with a minimum loss of time are design features of split pillow blocks announced by Shafer Bearing Corp., 1412 West Washington street, Chicago 7. Dowel bolts provide for alignment of cap, bearing and base, design of which allows two or four bolt mounting. Lubricant reservoir, served by a single filler hole and a single drain hole, assures cool lubrication. A Z-type oil seal retains lubrication and seals foreign matter out. Block employs self aligning bear-





(All claims are those of respective manufacturers. For additional information fill in and return the coupon on page 105.)

ing, with two roller assemblies, a one piece outer race and a spherical inner race. It is adaptable to line-shafting or machine installation in all industrial equipment.
Steel 12/30/46; *Item No.* 9041

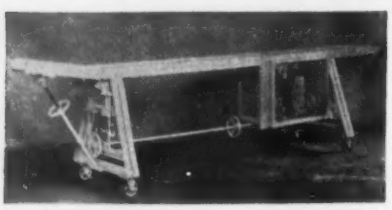
Circular Dividing Table

A circular dividing table, the Rotoptic with a table working diameter of 31½ in., is announced by Cosa Corp., 405 Lexington avenue, New York 17, representatives in the United States for Societe Genevoise D'Instrements de Physique (SIP) of Geneva, Switzerland. Designed for the Hydroptic B jig boring and mill-

ing machine, the table will withstand transversal stresses due to milling work. With worm used only to turn the platen and angular measurements made optically, accuracy is unaffected by wear. Outer edge of platen is graduated in 1/6ths of a degree for initial positioning, precise measurements being made on a built-in graduated circle by means of a microscope. Platen can be rotated by a motor in base and at rate of 4 rpm. Final settings are obtained by a knob keyed to driving worm.
Steel 12/30/46; *Item No.* 9940

Conveyor

Island Equipment Corp., 101 Park avenue, New York 17, recently placed on the market a new type conveyor for handling materials ejected from extruders. It carries the material a short dis-



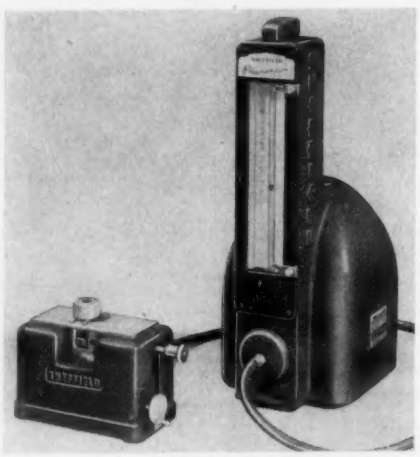
tance to allow cooling for later handling. Called a Unitable it has three control hand wheels. One adjusts the height of the 2 ft, infeed section so it fits closely to the outlet of the extruder. The other two, located in different positions, provide convenient operating positions for the travel speed of the conveyor belt.

Machine is equipped with large easy rolling casters which permit equipment to be moved easily and quickly. It also has a special belt to withstand the heat of the parts from the extruder. Variable speed units from 300 rpm maximum to zero rpm minimum can be supplied.
Steel 12/30/46; *Item No.* 9898

Ring Measuring Instrument

An internal measuring instrument for checking small rings from 5/32 to 1 in. internal diameter is announced by Sheffield Corp. of Dayton, Ohio. It also indicates taper, bellmouth and out-of-round conditions. Rings may be explored to a depth of 9/16-in. from each side by hand wheel vertical adjustment of the diamond tipped gaging arms.

Gage blocks are used in setting the comparator type instrument, amplification



of which is approximately 35,000 to 1. Deviations from the master setting of less than five millionths of an inch are easily read, as each graduated space representing five millionths occupies 0.175-in. on the scale.

With the new instrument, set-up is quickly made and a relatively inexperienced operator can easily adjust the ring on the gaging fingers so that the float indicates the true diameter of the piece.
Steel 12/30/46; *Item No.* 9897

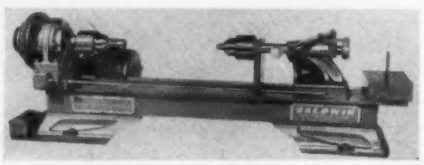
Bushing Assembly Press

Five different sizes of cam shaft bushing are assembled in eight cylinder motor blocks in one operation on the 15-ton cam shaft bushing assembling press manufactured by Oilgear Co., 1403A West Bruce street, Milwaukee 4.

Being semi-automatic in operation, the machine's electric-hydraulic control is so interlocked that bushing bar is not rotated into assembling position or pulled inward to press home bushings until operator has placed bushings on pins, and guided motor block into approximate assembling position. Block is located angularly by a small plug, individual rams pushing each bushing into place. Operation is by a single pushbutton, with emergency stop button halting cycle at any position. Reset button returns bushing arm to loading position. A two-way variable delivery pump connected to a 7½-hp motor provides the necessary fluid power.
Steel 12/30/46; *Item No.* 9988

Torsion Testing Machine

Developed by Sonntag Scientific Corp., Greenwich, Conn., and built by Southwark Division of Baldwin Locomotive Works, Philadelphia, this torsion machine (illustrated here) tests bronze, copper and steel wire with diameters from 0.090



to 3/4-in. Three twisting speeds 10, 20 and 30 rpm, with reversing rotation, are available with a maximum torque of 1000 in. lb. Stresses up to 80,000 psi can be obtained on 1/2-in. specimens. Specimen may be preloaded in tension and a reset type counter disengages automatically when the specimen fails during the testing operation.
Steel 12/30/46; *Item No.* 9042

Materials Handling Truck

Wide variety of bulk materials is handled by a high speed model HA truck developed by Frank G. Hough Co., Libertyville, Ill. It operates in congested areas, inside of box cars and in narrow aisles. Front drive wheels carry most of load, rear wheels being used for steering. Bucket, fork or other attachments may be used on loader which is hydraulically operated by twin cylinders. Bucket has capacity of 10½ cu yd. Transmission has two speeds forward and reverse. Final drive is through double reduction spiral bevel and spur gears. Brakes are of internal expanding hydraulic type. Tip-back feature on lift arms prevents spillage in transit.
Steel 12/30/46; *Item No.* 9922

Hose Couplings

Le-Hi Series 150-B, universal type all-bronze hose couplings, made by Hose Accessories Co., 2702-R North 17th street, Philadelphia 32, include a built-in locking device that provides maximum safety when using high-pressure air hose lines.

(All claims are those of respective manufacturers. For additional information fill in and return the coupon on page 105.)

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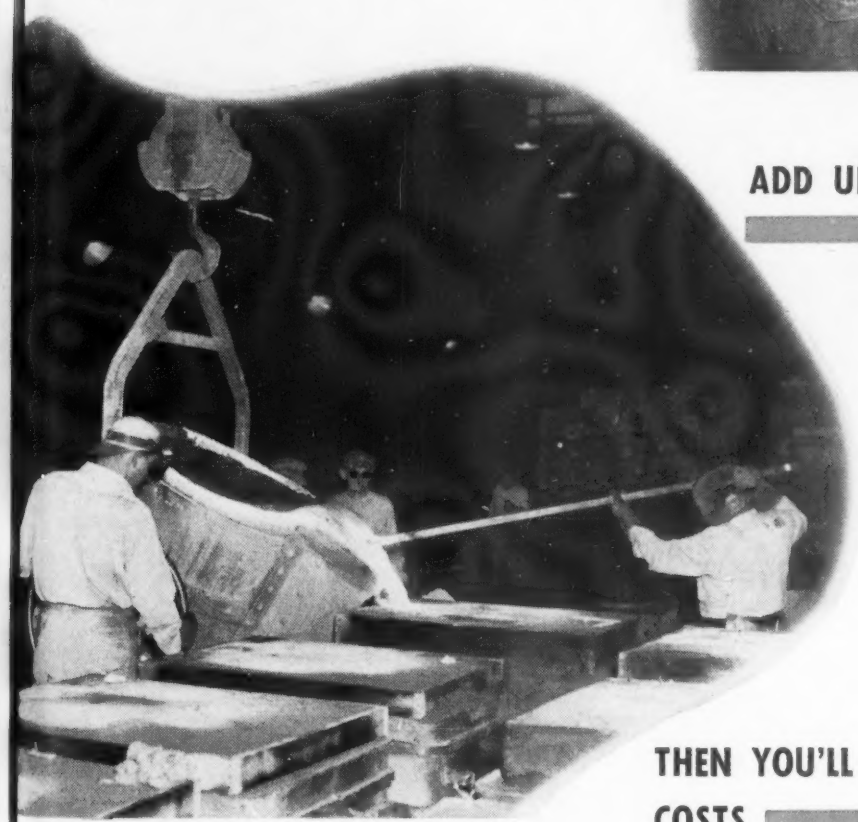
In the machine shop: you can set it down as expensive machine time saved when you eliminate faulty castings before work starts. With x-ray you can do exactly that! You can locate defects in advance . . . decide for yourself which castings to reject, which to machine . . . save many times the cost of the radiographs.



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In the foundry: there's a big cut in overhead when radiography is used. For it's quick and easy to determine the practicality of mold design . . . or the soundness of a foundry practice . . . merely by pouring pilot castings and x-raying them. You'll be able to make corrections swiftly, surely . . . more than pay for the x-rays out of the time and money you save.

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Kodak

Device eliminates danger of accidental uncoupling of hose lines even under roughest service conditions, yet permits easy engagement or disengagement of couplings when desired. It is not affected by dirt, mud or rough treatment.
Steel 12/30/46; *Item No.* 9866

Polishing Wheel

A modified compound of neoprene impregnated with abrasive grain gives flexibility and cushion action to the new flexible polishing wheel produced by Manhattan Rubber Division of Raybestos-Manhattan Inc., Passaic, N. J. Wheel is offered in various densities.

Combination of porosity and soft bond results in superior finishes. Due to soft bond speed is limited to 3000 sfpm. It is also supplied in pumice, rotten-stone and other mild abrasives.
Steel 12/30/46; *Item No.* 9867

Power Shovel

Osgood Co., of Marion, O., announces a new type 81 shovel, dragline, clamshell, crane and backhoe of medium size. Besides the three models mounted on crawlers, the machine also is available as a self-propelled, one-man-operated crane mounted on pneumatic tires. The three crawler types include models 810 of 1½ cu yd capacity; 816, of 1¾-cu yd capacity; and 817, equipped with wide tread crawler, and long crane boom for dragline, clamshell or crane service. All models are interchangeable from one class of service to another.

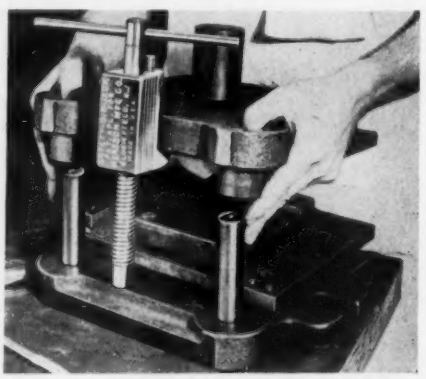
The type 81 is air controlled. Its air-cushioned clutch is used to apply power for hoisting and crowding, swinging, traveling, steering motions. Power from the engine to the reversing shaft is carried through a roller chain.

Standard boom hoist operates through the swing and travel clutches, by air, with the final drive for safety of worm wheel, fully enclosed. Additional safety factors are automatic safety brake, and a locking pawl.

Machine is steered in any direction without stopping the forward motion of the machine, and with the cab in any position. Steering clutches and brakes are operated by one lever. Shovel boom is all steel, electrically welded box girder type, with an extra wide boom foot. Dipper sticks are double outside type, with manganese steel racking. Shipper shaft is splined for pinion and sprockets, and is placed 6 in. above center of boom for greater digging radius.
Steel 12/30/46; *Item No.* 9892

Die Jack

Designed to separate die sets easily and quickly, a new safety die jack, manufactured by Persson Mfg. Co., 2 Henry street, Bloomfield, N. J., is applied to a punch holder in a few seconds, enabling operator to elevate and lower

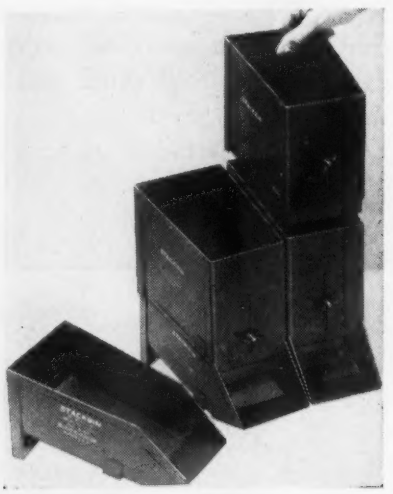


punch holder to any height. Clamp blocks are in one piece, made of heat treated, aluminum alloy. All other parts are machined of steel.

Jack is clamped to punch holder between guide pins. Screw is turned by means of removable handle bar—exerting straight-up pressure. In this position dies may be held for measuring or adjusting dies or punches.
Steel 12/30/46; *Item No.* 9812

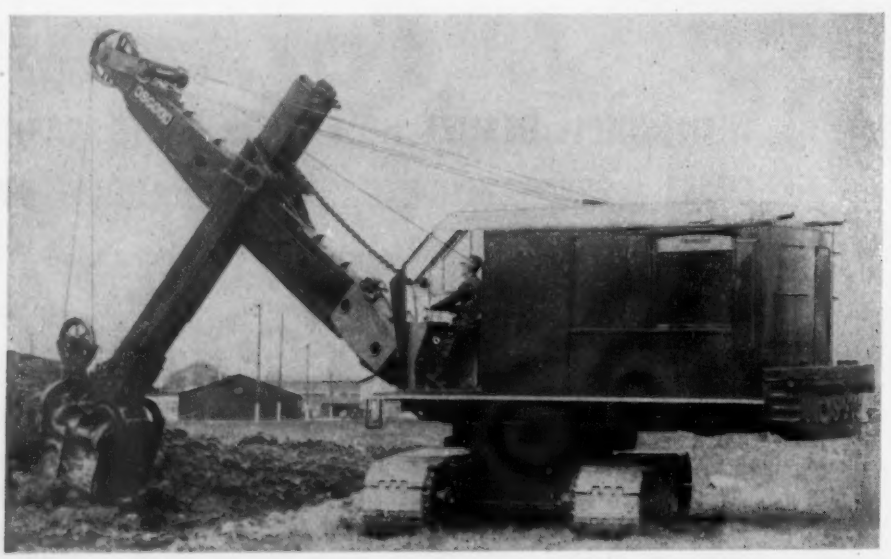
Adjustable Hopper

Regulating the flow of small parts in assembly bins is now possible by means of new, sliding-front hoppers announced by Stackbin Corp. of Providence, R. I. Each hopper not only provides increased capacity for parts, but also regulated flow



of parts according to sizes and weights. Its opening can be made small or large according to circumstances.

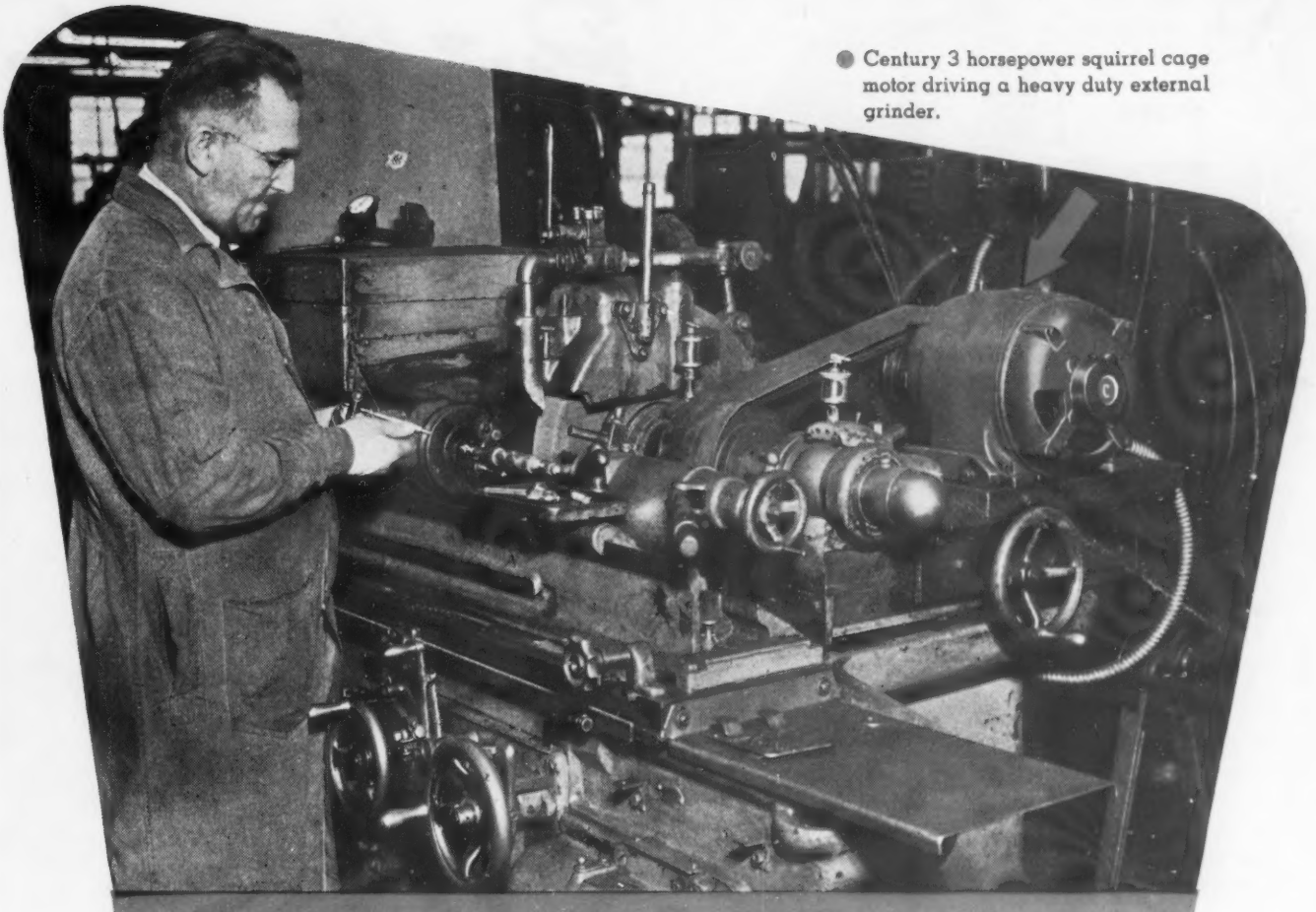
When two hoppers are used, one on top of the other, the increased weight of parts, which tends to force out too many units, can be offset by regulating the size of the opening. Hoppers are of heavy gage sheet steel with welded construction throughout. Attached to bins without the use of nuts and bolts, they remain absolutely rigid.
Steel 12/30/46; *Item No.* 9913



Induction Furnace

Designed for melting of finely divided aluminum alloy particles like turnings, chips and unbaled foil, the 125 kw induction melting furnace reportedly has low oxidation losses, yields being about 95 per cent of the dry weight of the charge. Made by Ajax Engineering Corp., Trenton, N. J., the furnace can be connected to standard frequency power lines of 60, 50 or 25 cycles. Pouring spout is located in line with rotating axis of furnace for direct pouring into molds. Tilting is by hydraulic ram and electric controls are housed in an internally wired self-contained control cubicle which also houses temperature control instrument.

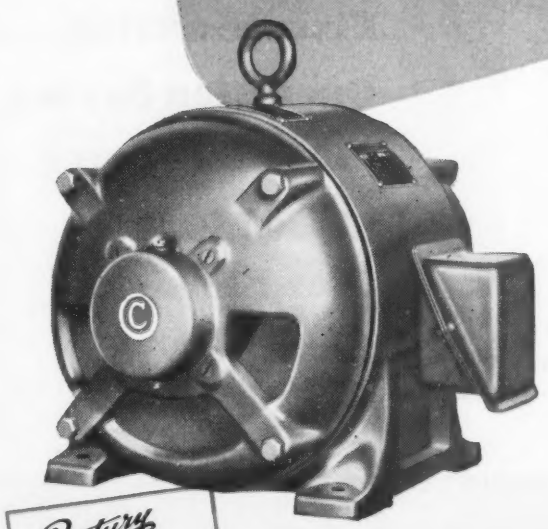
(All claims are those of respective manufacturers. For additional information fill in and return the coupon on page 105.)



● Century 3 horsepower squirrel cage motor driving a heavy duty external grinder.

Century Motors' *Accurate Balance*

Helps Maintain Machine Tool Accuracy



Accurate mechanical and electrical balance gives Century motors the smooth operation necessary to keep vibration to a minimum — to help maintain all the accuracy built into your machine tools.

The motor frame and end brackets are ruggedly built and accurately machined to form a rigid housing. Mounting feet are accurately machined — bearings are precision finished — scientific cooling system carries off heat — windings are sealed with Century triple insulation. All these features and many more give Century motors the stamina to maintain their freedom from vibration and to withstand the toughest kind of operating conditions.

They are built in a wide range of types and sizes from 1/6 to 400 horsepower to meet nearly any electric power requirement. Specify Century on all your electrically powered equipment.

Century C MOTORS

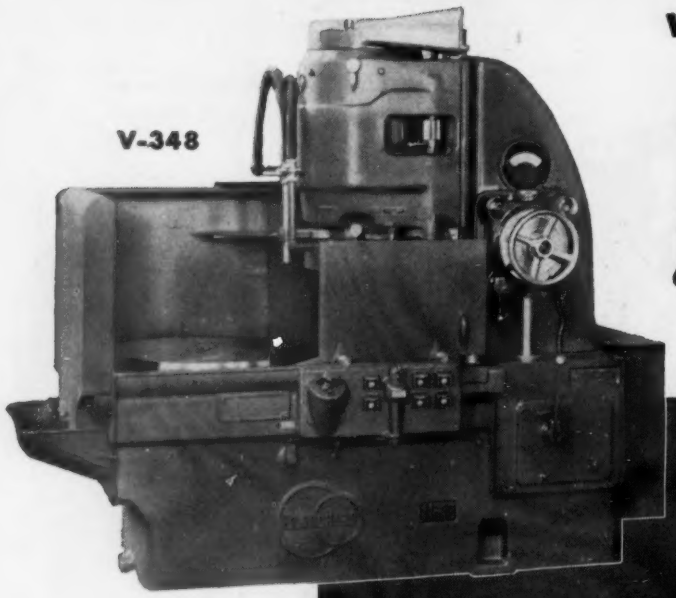
CENTURY ELECTRIC COMPANY, 1806 Pine St., St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

497

"Put it on the Blanchard"

from *start* to *finish*



Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

5" Dia. Valve Plates *finish-ground on both sides from the rough castings—in one operation per side.*

PRODUCTION: 33 pieces (66 surfaces) per hour.

Here's a typical example of the constantly increasing use of the Blanchard for machining flat surfaces on castings and forgings directly *from the rough* to finish—*in one operation.*

The 5" dia., ½" thick, cast-iron, pump-valve plates are held on the standard 36-inch magnetic chuck of a No. 18 Blanchard Surface Grinder. *Stock removal is 3/32" from each side.* The Blanchard easily meets the requirements of size tolerance of ± .001" and parallelism within .001"—*with a fine finish* so that no lapping operation is necessary to make tight joints.

"Putting it on the Blanchard" eliminates facing and lapping of each of the 66 surfaces. Production is more than tripled.

Blanchard engineers—with their more than thirty years' experience in grinding flat surfaces—welcome the opportunity of showing you how to grind it better . . . faster . . . more profitably.

Get These Advantages

- **Production** ✓
- **Adaptability** ✓
- **Fixture Saving**
- **Operation Saving**
- **Material Saving**
- **Close Limits**
- **Fine Finish** ✓
- **Flatness** ✓

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Supporting frame and tilting ram is also self contained.
Steel 12/30/46; *Item No.* 9032

Disk Grinding Wheels

Raised hub disk wheels, manufactured by Bay State Abrasive Products Co., Westboro, Mass., have a wide spread application, especially in field of welded or brazed metals. They can be used in foundries, sheet metal shops, repair shops.

Among advantages is the fact that edge can be used for grinding and even cutting off. Disks may be used efficiently right down to the nut. Wheel is cleaned quickly by touching the face on a concrete floor.
Steel 12/30/46; *Item No.* 9863

Jig Components

Straight, angle and wedge-screw designs and cam-type lever-operated units for a wide range of work-holding requirements are included in the line of jig and fixture components manufactured by Morton Machine Works, 2422 Wolcott street, Ferndale 20, Mich. Unit parts are of heat treated alloy steel and are available from stock. Details are available from the company for each assembly and also for individual parts which can be purchased when the user desires to make his own assemblies.
Steel 12/30/46; *Item No.* 9902

Coating Tank

Two new hot dip tanks, one with explosion fittings for compounds for high vapor transmission, are being manufactured for plastic skin protective coating dipping operations by Aeroil Products Co., West New York, N. J. Both models, designated as models 5 and 5E, feature variable speed mechanical agitation through an air-powered turbine motor, safety control through double thermostatic reaction connected with cooling system, provision for rapid heating and indirect heating by means of an

agitated hot oil bath that is thermostatically heated to between 100 and 550°F. Both tank and cover of the units are insulated to conserve heat. Full clear dripping space of both models is 16 in. long, 13 1/2-in. wide and 13 in. deep.
Steel 12/30/46; *Item No.* 9987

Paper Dispenser

Made for mounting against a wall, the Roger roll paper dispenser made by Lefebvre Freres Ltd., Montreal, Canada, provides a permanent dust proof cabinet. Paper tears off with a clean smooth edge and sensitive papers such as blue print paper, can be handled if dispenser is located in subdued light or protected with a light proof cover. Cabinet is made of heavy gage welded steel and is provided with a retracting handle. Two sizes are available, one 6 x 6 x 42 in. for rolls up to 5 in. in diameter and 36 in. long and another 6 x 6 x 48 in. for rolls up to 5 in. in diameter and 42 in. long.
Steel 12/30/46; *Item No.* 9896

Electroplating Generator

Low voltage electroplating generator line, announced by Motor Generator Corp., division of Hobart Bros. Co., Troy, O., includes six models ranging in size from 100 amp at 6 v to 2000 amp at 6 v or 1000 amp at 12 v.

One, designated as No. 130 model, is rated 1000 amp at 6 v or 500 amp at 12 v. Generator, driven by a 10-hp motor at 1200 rpm is adaptable to still plating tanks for nickel, copper, brass or cadmium. This double commutator machine can be connected in series to get 12 v or less for barrel plating and electrocleaning.
Steel 12/30/46; *Item No.* 9852

Safety Spectacle

Featuring a semirimless frame hinged to fold at the bridge, a new type, hollow stainless steel temple safety spectacle, developed by Watchemoket Optical Co. Inc., Providence 3, telescopes to one-third of its normal length. The spectacle is provided with lenses of shatterproof plastic, especially resistant to high velocity impact. Clear or green tinted lenses are interchangeable, being locked in a plastic frame. Hinge between temple and frame locks in place automatically.
Steel 12/30/46; *Item No.* 9991

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9043	9897	9913
9047	9988	9032
9889	9042	9863
9044	9922	9902
9039	9866	9987
9041	9867	9896
9940	9892	9852
9898	9812	9991

12-30-46

NAME ..... TITLE .....

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PRODUCTS MADE .....

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CITY and ZONE ..... STATE .....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

Why Use E6012 Electrodes?

(*Continued from Page 73*)

Next, consider the matter of x-ray soundness. Under some conditions of welding, E6012 weld deposits may be porous. One of these is shown in A, Fig. 1. Other welding procedures produce sound welds as indicated in B, Fig. 1. E6012 weld metal is less fluid than some other types. For this reason, stringer beads, higher current, slower rates of travel or other techniques are selected to keep the pool molten long enough for gas to escape. Single pass welds and stringer bead welds are generally perfectly free of porosity. Shafts are often built up with E6012 metal. Subsequently, the added metal is machined to finished shaft dimensions. If these deposits were porous, E6012 electrodes could not be used for this application.

Now what about penetration? This is a relative question. On light-gage work, for instance, care must be exercised to prevent "burning through" which might be described as too much penetration. On heavier structures, of course, there is no danger of burning through. Here it is necessary to get enough penetration. Usually the currents employed insure ample penetration. Or preparations such as illustrated in Figs. 2 and 3 permit the desired penetration into the parent metal. In the butt weld both the gap and the land zone are adjusted to enable the welder to drive his weld metal all the way through to the back side. Or, as shown in the fillet weld drawing, a gap will increase penetration. Ordinary fit-up usually results in a small gap anyway. Even if no special preparation is used, penetration will be ample. If penetration was questionable, the large number of steel smoke stacks constructed with E6012 electrodes might be expected to topple to the ground in a high wind. Or freight cars so built could easily tie up our rail transportation system if penetration were inadequate.

What about convexity? The E6012 deposits tend to be convex although such convexity can be controlled. Higher currents lead to flatter welds. Or welding may be done slightly downhill with less crowning of the bead, and faster production speeds. In the hands of good operators, the degree of convexity is not objectionable.

Proper for Poor Fitup

The E6012 electrodes are proper for poor fitup conditions just as jails are proper for the incarceration of criminals. Poor fitup and the commission of crimes are both undesirable conditions. Yet they exist. And something must be done about them.

Take the example in Fig. 4. This assembly had to be fabricated from one side only. The first pilot unit showed poor fitup. Using the bead sequence shown, the wide gap was bridged to make a perfectly good weld. Subsequent assemblies corrected the fitup condition with a definite improvement of fabricating costs.

There are good and sufficient reasons for the popularity of E6012 electrodes including freedom from undercut, ability to use large diameter electrodes on lighter sections of steel, usability at high currents, deposition of multiple stringer beads without cleaning slag, low spatter loss, good arc stability and limited dilution from parent metal on high carbon steels.

Freedom from undercut is a desirable characteristic not only for vertical and overhead welding but also for horizontal fillet welding. Considerably more skill is required when using E6010 electrodes on vertical and overhead work as compared with that necessary for E6012 electrodes. Similarly, where E6020 electrodes can undercut the vertical leg of a horizontal fillet, this condition is impossible with E6012 electrodes.

Steels in the thickness range from $\frac{1}{16}$ to 3/8-in. lend themselves to fast welding at high currents with large diameter electrodes. Butt welds in large diameter—about 8 to 15 ft in diameter—storage tanks may be made with 1/4 and 5/16-in. electrodes when the plate thickness is 1/4-in. Fillet welds of uniform small size joining the sides of the tank to the bottom or roof are commonly deposited with 5/16 x 18-in. E6012 electrodes. Travel speeds are good, with 45 to 60 ft per hour being obtained in some shops where suitable trunnions are available. Costs in this highly competitive field are low and weld appearances are quite pleasing.

Considering the thin coating on E6012 electrodes, welding currents are high. Many welding shops boost the current up to a value that leaves a glowing stub without experiencing any deterioration of weld quality or bead shape. Naturaly welding currents are relative. But the combination of large electrode diameter and greater currents with the quick-setting E6012 electrodes shows up on the cost sheets. More heavily coated electrodes such as E6013 and E6020 may permit still higher currents for equivalent electrode diameters. But the more fluid weld metal is liable to require the use of a smaller diameter electrode. Or the more fluid weld metal which leaves a weld with a thinner throat section can develop cracks in some assemblies. All of these factors must be balanced before a final decision is reached on the best electrode type.

Two advantages accrue from the thin slag of the E6012 electrodes during the welding of multiple-pass horizontal fillet welds such as the one shown in Fig. 5. Slag is cleaned after the first bead, but not after the second. Finally, cleaning is completed following the third bead. The two benefits are the elimination of cleaning one bead, and the improved shape of the completed weld. When this rather simple procedure is followed, the fillet surface is smooth and flat. For all practical purposes the weld seems to have been made in a single finishing pass. Other combinations to minimize cleaning without any lowering of quality or appearance

NEW LITERATURE

HOW TO FIGHT FIRES AND PROTECT PROPERTY
By Randolph Laboratories Inc., 8 East Kinzie street, Chicago 11. A 20-page booklet which graphically explains and illustrates latest techniques in fighting fires.

COLD CHAMBER DIE CASTING
By Hydropress Inc., 572 Lexington avenue, New York 22. Folder L-24-C discusses the principles of Hydrocast die casting in detail and three typical stages are diagrammed.

TUBING HEAD
By National Supply Co., P. O. Box 899A, Toledo 1, O. Bulletin No. 327, illustrated, 4 pages, describing Type W tubing head.

GEARS
By Abart Gear & Machine Co., 4832 West 16th street, Chicago 50. Bulletin, illustrated and in colors, contains engineering data on spur, bevel, worms, helical, internal, worm wheels, spiral, sprockets and racks, precision cut of any gear material.

FORMULAS AND PROCESSING
By Eastman Kodak Co., Rochester, N. Y. Third revised edition contains comprehensive list of formulas together with discussion of principles and procedures for processing films, plates and pages; plus a new section on negative faults.

PRECISION BALL BEARINGS
By Jack & Heintz Precision Industries Inc., Cleveland 1. Catalog 2000, illustrated, discusses various applications of bearings, phases of their manufacture and data.

PRESSURE PACK EQUIPMENT
By National Supply Co., P. O. Box 899A, Toledo 1, O. Bulletin No. 328 gives list of specifications and detailed blueprints of equipment and features series of photographs and captions showing how to install equipment.

CHUCKS AND COLLETS
By Procunier Safety Chuck Co., 18 South Clinton street, Chicago 6. Two-color brochure on features of quick change chucks and collets.

MOTOR SERVICE
By Westinghouse Electric Corp., Box 868, Pittsburgh 30. A 12-page booklet describing in detail three service plans to provide 100 per cent service coverage for all fractional horsepower motors, telling who is entitled to use them, how they operate and what can be accomplished by them.

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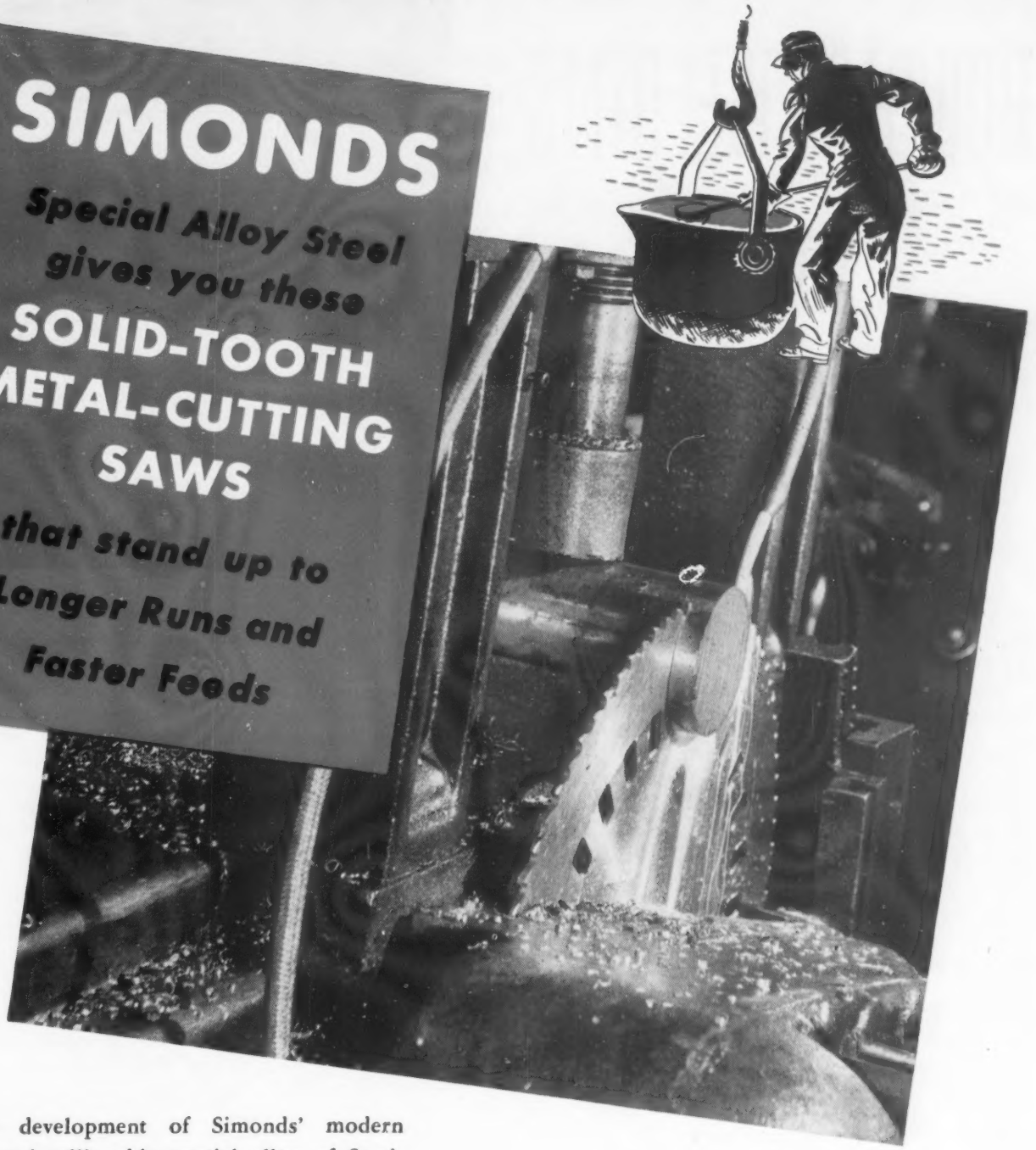
Special Alloy Steel gives you these SOLID-TOOTH METAL-CUTTING SAWS that stand up to Longer Runs and Faster Feeds



Exclusive development of Simonds' modern electric steel mills, this special alloy of Semi-High-Speed Steel gives you longer runs at faster feeds . . . on a wide range of work from mild steel and cold-rolled shafting to high-speed and chrome nickel steels.

Another exclusive Simonds process is the method of grinding side-clearance . . . a method which produces Solid Circular Saws with uniformly accurate rim-thickness. Then the saws are finished by still another special process which leaves no hammer-marks on the plate.

These exclusive advantages are *your triple warranty* of longer life and plus-performance in Simonds Solid-Tooth Circular Metal-Cutting Saws. Order them from your Industrial Supply Distributor or from the nearest Simonds office.

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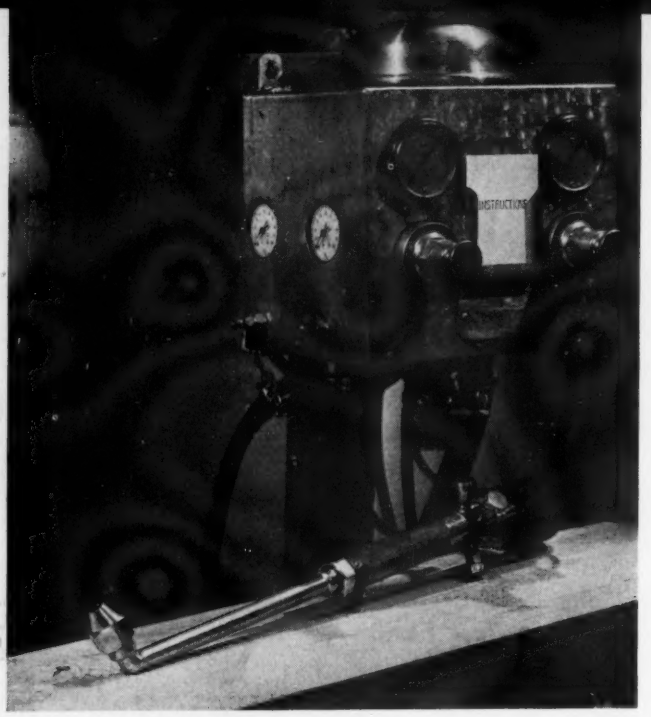
POWDER WELDING
with a new flame tool



SOME unusual welding and metal or plastic surfacing processes are seen in a new flame tool known as Powder Weld announced recently by Powder Weld Co., Brooklyn, N. Y. Welding applications are said to be restricted only by limitation of the variety of suitable powdered metals now available for welding.

As shown in the accompanying photograph, equipment consists of a torch which has a special nozzle and 16 independent controls, control box with air and gas pressure regulating valves and a canister from which powdered materials are fed through the flame. Flame is generated and controlled by preselected combinations of gases and air.

In welding, compositions of powdered or finely divided metals, together with suitable fluxes are projected through the flame cone on the work surfaces. Fuel gas, oxygen and a processing gas are used together to provide temperature control.

Separate flux application is eliminated when tool is used as a welding or brazing torch with conventional rod or wire, and fuel gas and oxygen are employed. By using independent sources of neutral or modifying gas available at the nozzle of the torch, correct quantity of flux is deposited in powdered form through cone of the flame. Dry fluxes can be used without mixing with liquids that might cause oxidation. Controlled atmosphere rod welding is performed by the tool using any type of rod or wire and flux. Gases can be made to carry liquid fluxing solutions by bubbling them through chosen solutions.

Most prevalent use of powder welding at the present time is in hard surfacing. More alloys are available in suitable form for hard surfacing than for welding or brazing. Various chemical compositions of the plastics group, such as polythene, some polyvinyls, silicones and elastomers can be applied by the powder weld system. According to the manufacturer, the new tool can be used with various glass-forming compositions—silicon and other frits which result in enamels and glazed coatings.

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standards can be worked out along similar lines.

While on the subject of cleaning, the low spatter loss with E6012 electrodes deserves mention. Metallic arc welding is a field in which craftsmanship is visible for all to see. A neat, clean weld, with adjacent surfaces cleaned of all spatter, inspires confidence in the product. The old days of painting over slag and spatter are happily gone. Because of the slight spatter produced by E6012 electrodes, cleaning costs are low.

During the war, E6012 electrodes were further improved. The improvement was quite pronounced with regard to arc stability. A more highly stabilized arc reduced operator fatigue, and bettered alternating current response. In addition, E6012 electrodes gave a better account of themselves on sheet metal applications. Automobile and truck bodies, for example, are now being welded with both E6012 and E6013 electrodes although the latter seems to have been played up more in articles recently.

There are two distinct types of E6012 electrodes available from several manufacturers. The differences are not like those described for the E6013 electrodes (see STEEL, March 4, 1946) but are more concerned with penetration. In the case of the E6013 electrodes, two vastly different types of coating were involved. As regards the E6012 electrodes, however, the coating types are much the same. One design is "cold," the other is "colder."

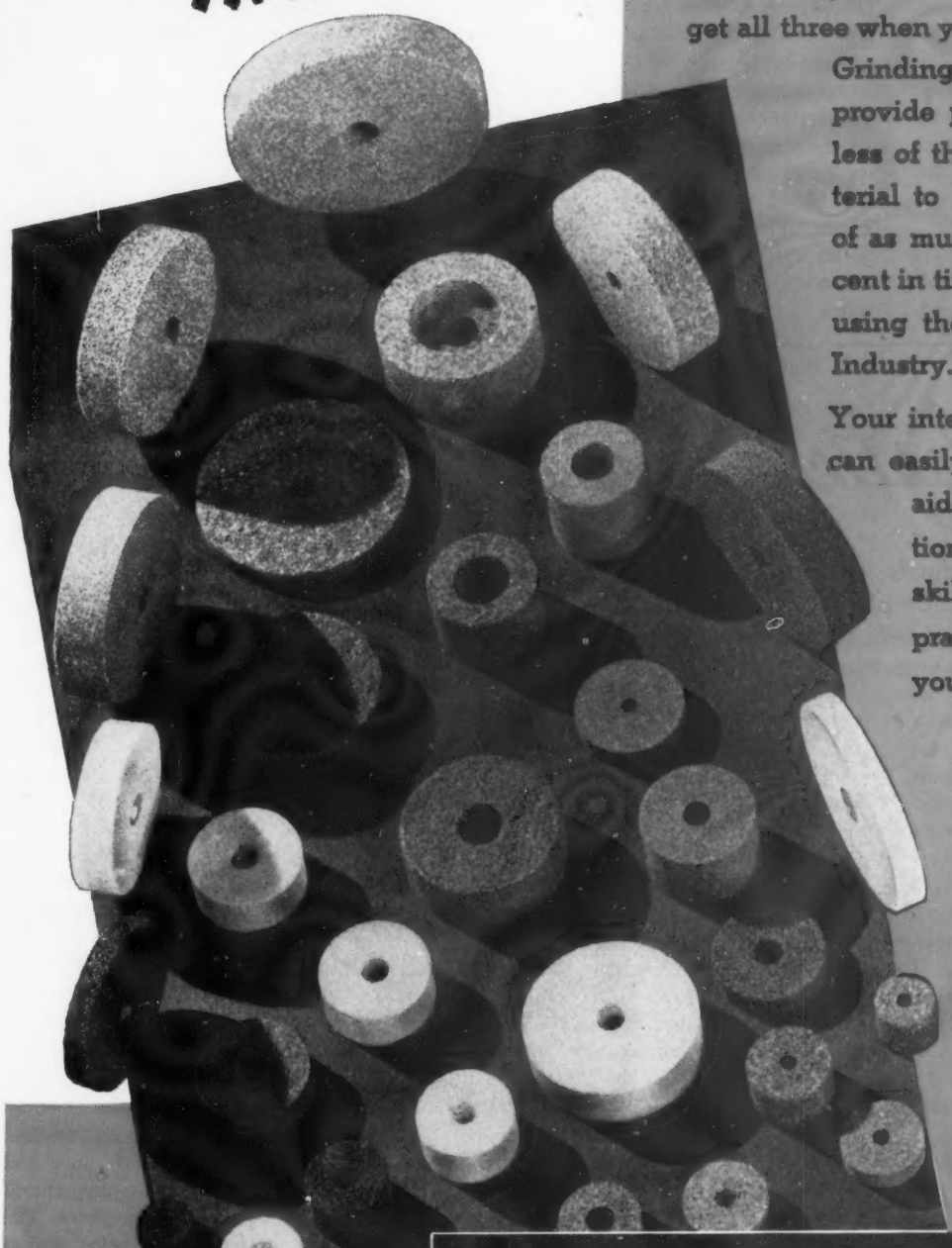
There are two noticeable effects from using the "colder" electrodes: Reduced penetration and greater current-carrying ability. High carbon steels, carbon 0.60 or more, are difficult to weld because of cracked welds and cracks in the parent metal. Using the "colder" E6012 electrodes, cracked welds are overcome. The explanation is found in the lesser carbon pick-up with the "colder" electrode as carbon reduces the ductility of the weld deposit. But cracking of parent metal is still likely to occur.

Subsurface cracking of hardenable steels, attributed to hydrogen evolved from the electrode coating, is objectionable. The safest procedure is to use a practically hydrogen-free electrode such as the lime-ferritic. Still there is a considerable amount of high carbon fabrication with "colder" E6012 electrodes where failures have not been troublesome. For complete safety, the lime-ferritic electrodes ought to be specified wherever service records are not at hand to indicate satisfactory performance with the "colder" E6012 type.

Examples of E6012 electrode applications already mentioned include crane trolleys, snow plows, gear blanks, smoke stacks, freight cars, tanks, shafts and auto and truck bodies. Other E6012 weldments where quality of fabrication is very important are structural work, machinery of all types, heating boilers, foundry equipment, casting repairs, landing gear supports, power shovels and boiler staybolts.

A comprehensive review of the E6012 electrode situation today was undertaken in an effort to show why these electrodes show a greater demand than all other types combined. Assurances are given on the quality question. Good points were cited. And a few applications have been mentioned. But the E6012 electrodes are not cure-alls. There are plenty of places where other grades should be used. However, no fabricator can afford to overlook the E6012 types if he wishes to do good welding at low costs.

Sterling
INTERNAL GRINDING WHEELS



● Accuracy, economy, superior finish—you get all three when you use Sterling Internal Grinding Wheels. These wheels provide positive control regardless of the slight amount of material to be removed. A saving of as much as seventy-five per cent in time is often achieved by using these tested "Wheels of Industry."

Your internal grinding problem can easily be solved with these aids to faster, better production. A Sterling engineer, skilled in modern grinding practice, will gladly call at your convenience. Write!

■ The Sterling Specification Selector lists the proper wheels for hundreds of operations. Ask for your copy.

· STERLING ABRASIVES ·

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Modern Laboratory

(*Concluded from Page 66*)

24 x 24 x 20 in. box type furnace, an Eclipse gas-fired furnace, Fig. 8 for tempering, a small Hevi-Duty electric box type furnace, a Hoskins hardenability furnace and a small Lindberg pot furnace. Laboratory metallurgists maintain constant supervision of the plant heat treating practices.

A 250,000 v General Electric x-ray machine, Fig. 6, capable of penetrating 3 in. of steel or 10 in. of aluminum is used for radio-graphing aluminum castings used in the company's hydro-torque drive transmission, and other miscellaneous cast iron, steel, and malleable iron castings. The work table is hydraulically raised or lowered to obtain the proper focal distance. Protection from x-ray radiation is obtained by the use of ¼-in. lead panelling throughout the room.

A novel feature of the dark room is the space saving revolving door which eliminates the usual labyrinth approach. The door was designed by company engineers and the roller bearing assemblies on which it operates were built in the machine shop.

Use of Radar Extended To Commercial Ships

Navigational aid and anti-collision protection from 100 yd to 32 miles in any direction from a vessel is said to be furnished by new radar equipment designed by Westinghouse Electric Corp., Box 868, Pittsburgh. The basic installation consists of antenna and transmitter, pre-amplifier unit and an indicator console unit.

According to manufacturer, range discrimination is sufficient to indicate as separate sightings any two objects lying on same bearings but differing in range by 100 yd or more. General performance shows high coast lines at maximum range of 32 miles, cargo type vessels at 12 to 15 miles, and standard buoys at 3 to 4 miles.

Revised Standard on Pipe Nipples Published

Commercial Standard CS5-46, entitled "Pipe Nipples: Brass, Copper, Steel and Wrought-Iron," was revised recently and is now available from National Bureau of Standards, Department of Commerce, Washington. Intended to effect a common understanding between manufacturers, distributors and users of pipe nipples, the standard covers nipples of the above materials in sizes from ⅛ to 12 in. (iron pipe) and ⅛ to 6 in. (copper and brass), both in standard lengths. Standard also contains information on material, packaging, labeling.

—o—

A bound bibliography which includes a comprehensive coverage of four major factors in die casting—alloys, design, applications, and process technique—is now available from Technical Publishing Co., 1240 Ontario street, Cleveland 13. Representing three years of data collecting, it contains more than 1200 references and costs $7.50.

Bonding Plastics and Metals

National Bureau of Standards investigations reveal that coefficients of thermal expansion of components can be matched, yielding stable bonds even between large sections and over extreme temperature changes

SATISFACTORY bonding between a plastic and a metal facing or metal reinforcement has been practically impossible in the past, primarily because the two materials differ in their coefficients of expansion. Plastics have relatively high coefficients of expansion, in contrast to metals, and changes in temperature create forces that prevent satisfactory bonds. Investigations at the National Bureau of Standards by P. S. Turner of the plastics section have shown that the coefficients of thermal expansion of components can be matched, giving a bond between the components resistant to temperature changes.

Bonds produced by adhesives fall into two classes: The rubbery or yielding bond and the rigid bond. First category includes most thermoplastic cements, rubber cements, and combinations of thin rubber layers and cements. These adhesives provide durable bonds between dissimilar materials at moderate temperatures. The rigid bond generally proved unsatisfactory for such applications with the possible exception of cold-setting cements of phenol-formaldehyde and urea-formaldehyde types.

At reduced temperatures, however, the yielding adhesives lose their ability to eliminate stress concentrations by yielding with the dimensional changes of the materials bonded. If it can be obtained, the rigid bond is superior for many purposes because it produces a stronger and less yielding product. For composite structural material subjected to extreme temperature changes, a stable rigid bond is imperative. The solution lies in the matching of thermal-expansion coefficients of the components.

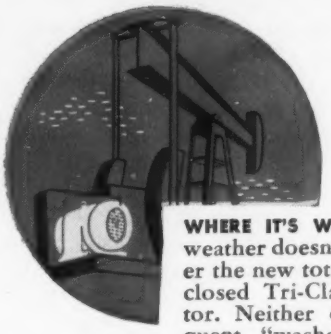
The formula derived by Mr. Turner was used successfully in a number of applications. A mixture of polystyrene and aluminum oxide, for example, was determined in this fashion so that brass inserts were feasible. Brass inserts in ordinary polystyrene cause the polystyrene to crack as a result of the differences in thermal-expansion coefficients. The coefficient of linear expansion of polystyrene is approximately 70 x 10^{-6} per degree C, while that of brass is about 17 x 10^{-6}.

Fused aluminum oxide was chosen for use in the mixture because it has a low coefficient of linear thermal expansion—8.7 x 10^{-6}—and a high modulus of elasticity compared to its density. Its choice for use with polystyrene was also determined by its desirable electrical properties; there was no appreciable change in the electrical resistance of polystyrene on addition of the filler.

Calculations revealed that approximately 90 per cent of polystyrene and 10 per cent of aluminum oxide would be required to match the coefficient of linear thermal expansion of brass. Analysis with polarized light indicates that there are stresses in the pure polystyrene concentrated at the boundaries between the brass and polystyrene, and these are sufficient to rupture the polystyrene. With about 10 per cent of fused aluminum oxide filler, such stress concentrations are absent and there is no evidence that the filled styrene fractured. The brass was sufficiently well bonded to the polystyrene to permit sawing and machining of the composite material.

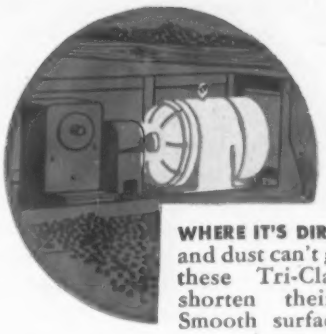
Rivet fillers for aluminum, used to cover the depressions caused by riveting, have also been developed by this method as well as a mixture of glass fiber and phenolic resin designed to match aluminum alloy metal reinforcing plates. The technique permits the formulation of pigmented protective coatings that have satisfactry adhesion to the coated material. In general, the method provides information leading to the proper combination of materials for a matching of thermal coefficients, which in turn yields stable bonds even between large sections and over extreme temperature changes.

FOR TODAY'S TOUGHER JOBS, HERE'S A NEW TOUGHER MOTOR



WHERE IT'S WET Wet weather doesn't bother the new totally-enclosed Tri-Clad motor. Neither do frequent "washdowns" in food plants.

WHERE IT'S CORROSIVE Acids, alkalis, and fumes are kept out of these new Tri-Clads. Cast-iron enclosures are corrosion-resistant, extra strong.



WHERE IT'S DIRTY Dirt and dust can't get into these Tri-Clads to shorten their life. Smooth surfaces are convenient to clean.

WHERE IRON DUST FLIES Harmful iron dust and metal filings can't get past the inner wall. Bearings are protected from dust.

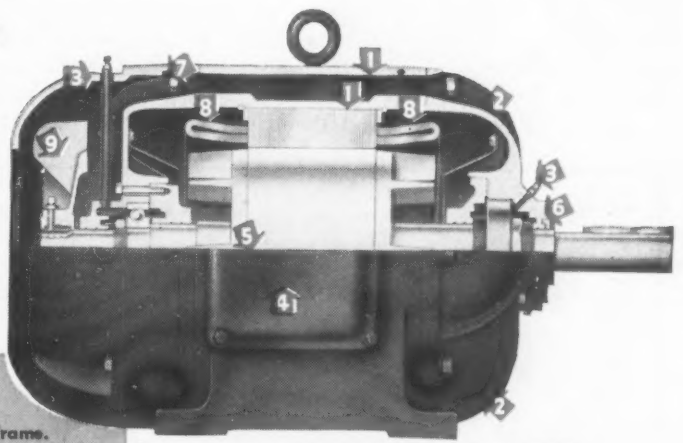
WHERE QUARTERS ARE CLOSE When space is limited for a totally enclosed motor, you'll like these trim, compact new Tri-Clads.

WHERE EXPLOSION HAZARDS EXIST The new Tri-Clad motors are available in explosion-proof constructions where needed.

THE G-E *TRI-CLAD* TOTALLY ENCLOSED MOTOR

(1 TO 1000 HP)

In 1940 you welcomed the Tri-Clad open motor with it's *extra protection features*. More Tri-Clads have since gone into service than any other integral-horsepower motor. Now G.E. is ready with a new line of tough, totally enclosed Tri-Clad motors for use in adverse atmospheres. *We believe they are industry's most dependable motors.* Their longer life and lower maintenance will make them a sound investment on almost every job. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.



10-POINT PROTECTION

1. A cast-iron, double-wall frame completely encloses and protects the windings and punchings.
2. Corrosion-resistant cast-iron end shields are machined to provide a tight seal, and protect the motor from dust, dirt, and moisture. Primer and finish coat of Glyptal* varnish affords high rust-resistance.
3. A pressure-relief greasing system, which can be packed with long-life lubricant, protects the bearings.
4. The cast-iron conduit box is diagonally split for easy wiring. Boxes are independently explosion-proof on Class I motors.
5. Nonshrinking compound around motor leads protects motor interiors from dust and moisture at the point where leads pass through the frame.
6. Rotating labyrinth seal further protects motor interior from damage by foreign matter.
7. Large air passages provide adequate protection from overheating. They're easy to keep clean and open, too.
8. Modern, "ageless" insulation treatment includes windings of *Formex magnet wire.
9. The powerful external fan is removable to simplify maintenance; nonsparking type in explosion-proof motors.
10. Individual dynamic balance of rotors and external fans protects against vibration hazards, even under severe operating conditions.

*Trade-mark Reg. U. S. Pat. Off.

FOR THE COMPLETE STORY

Apparatus Department, Section V750-278C
General Electric Company
Schenectady 5, N. Y.

☐ Please send me GEA-4400, which describes the new Tri-Clad totally enclosed motors.

☐ Please send me GEA-4131, "Motors and Control for Hazardous Locations."

NAME .....

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5080

GENERAL ELECTRIC

Buffing and Polishing

(*Concluded from Page 69*)

or two portables than to install a small central system.

Because of their filtering bags, self-contained units are not suited for direct connection to machines on which buffing compounds are used. In such cases cyclone separators should be interposed between polishing hoods and cabinets to trap sticky lint, before it gets into bags.

Some unit-type dust collectors used on polishing and buffing as well as on grinding operations, have the suction fan located on top of cabinet and employ multiple cloth filter tubes instead of filter bags. These tubes are cleaned by means of a shaker arrangement which dislodges the dust, causing it to fall into a pan at the bottom of the unit.

Magnesium dust produced in buffing, polishing and grinding, constitutes a major fire hazard. Never use ordinary dust collectors on magnesium jobs. Special dust collecting systems for this purpose use water spray to precipitate the dust, which is removed as thoroughly wetted sludge. This wet sludge must be kept in air-tight containers until safely disposed of either by burning on a dump or by mixing it with sand and burying it.

Central Collecting Systems: The cyclone separator plays an important role in centralized dust collecting systems. Pipes coming from polishing hoods of each unit in a battery of machines are led into one large pipe, which in turn enters the side of the suction fan housing. Dust drawn into the fan housing is expelled by the blast wheel through a pipe into the cyclone separator.

The blast enters at one side tangent to the upper, cylindrical part, thereby creating a miniature cyclone. Dust and heavier particles are thrown outward against the casing, by centrifugal action, then gravity pulls this debris spirally downward. Clean, expanded air escapes gently through the top vent of the separator, while precipitated dust falls into a bin at the bottom.

With central exhaust, it is customary to arrange two rows of polishing and buffing machines back to back. The horizontal main duct can either be run along the floor between the two rows or—when other use must be made of this space—suspended horizontally below the ceiling. In the latter event, fan and driving motors are mounted on a platform likewise suspended from the ceiling.

With either arrangement, small pipes from each individual polishing and buffing unit should have curves of largest possible radii and smallest possible junction angles. Such a system represents a real engineering job. To insure maximum efficiency and protection to operators, design and installation should be entrusted only to specialists.

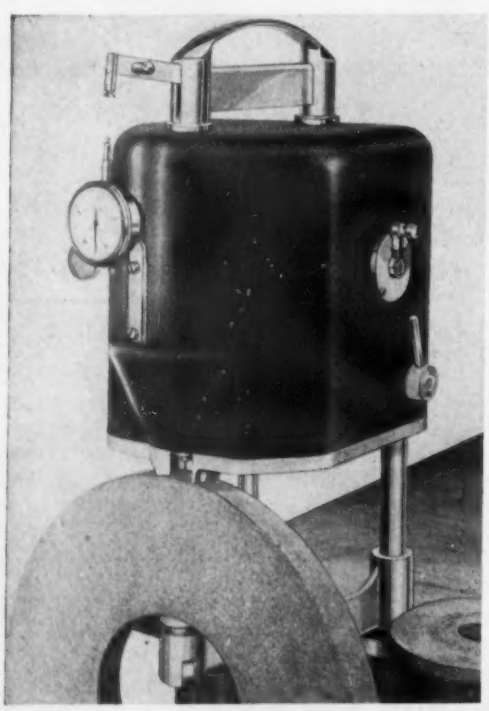
Dust Collection Booths: Portable tools for polishing and buffing operations are highly important on certain types of work. Increasing use is being made of these tools in polishing and buffing booths from which unclean air continuously is exhausted, just as it is from a paint spraying booth. A great deal of polishing with portable electric and pneumatic tools also is being done right out in the open, the work resting on metal grilles directly over tanks of water. A large volume suction-blower pulls dust-ladened air down through the grille. At the back of the tank a motor-driven centrifugal pump maintains a curtain of water against a baffle. Air after being sucked around the work and down through the grille, passes back over the surface of the water, downward and under the baffle, then up through the water curtain, and finally out through the blower. Dust is washed out of the air as it passes through the water curtain and is precipitated in the tank as sludge. It must be removed regularly.

In a variation of this system a wooden grille is used and air washing is accomplishing by agitating the water in the tank below, thus breaking its surface into a mist which precipitates dust particles. Such installations are popular where magnesium is cleaned, polished and buffed.

There are down-draft installations which dispense with water. Their grating —bench high for convience in working —cover suction chambers which are connected by pipes to main exhaust ducts below the floor. Dust-laden air is drawn down through the grilles and through the duct system by a powerful, large-volume suction blower. Separation, and subsequent dust and air disposal, are the same as in the central exhaust system already described.

One great advantage of all these systems is that they allow polishing and buffing to be done in close proximity to precision machines and other fine equipment, without exposing them to danger of abrasive damage.

(*To be continued*)



DEVICE TESTS
Hardness of Grinding Wheels

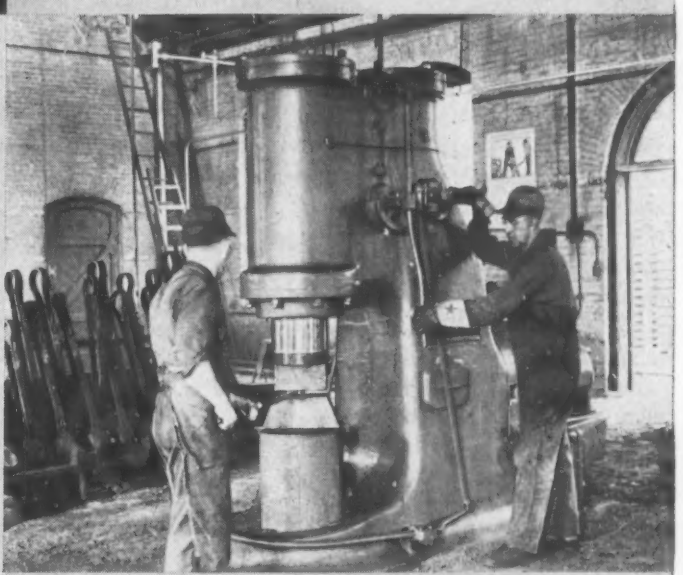
REQUIRED strength of bond of a grinding wheel varies greatly according to conditions under which the wheel is used. Bond required to hold an abrasive grain in place on a 4-in. wheel would be too strong for holding the same size grain on a 12-in. wheel. As diameter of the wheel increases, circle forming periphery approaches a straight line.

These same variations occur with different diameters of work being ground. Thus diameter and width of the wheel, diameter and rigidity of piece being ground, rigidity of the machine, amount and type of metal being removed, and speed all tend to alter the action of a grinding wheel. For best grinding results, proper strength of bond should be determined, and a reasonable tolerance limit for this strength should be established for each grinding operation.

Hardness of grinding wheels is said to be determined accurately in mathematical units by the instrument shown here, manufactured by Abrasive Engineering Corp., Spring Lake, Mich. The device, called Grade-O-Meter, works on grinding wheels up to 6-in. in diameter in the same manner as a metal hardness tester works on metals. Its use, the company states, allows operation standardization since advance checking prevents use of the wrong type of wheel for work in progress.

A Forging Department right in your own plant . . . . . without steam or air lines . . . . . .

The Chambersburg Pneumatic Hammer can be located anywhere without respect to steam lines, air lines, shafting or belting. It carries its own source of power—its motor-driven compressor. There is no load on steam boiler or air compressor—yet, wherever electricity is available, it is ready for work instantly.



A wide range of sizes—200 lbs. to 5000 lbs.—makes this unit ideal for practically any forging requirement, from tool room use in forging and dressing tools, in foundry work, as in straightening reinforcing rods, etc., to large forgings for maintenance or production. Write for Bulletin 1275.

CHAMBERSBURG ENGINEERING COMPANY Chambersburg, Pa.

CHAMBERSBURG

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The Business Trend

Production Pace Regains Most of Lost Ground

BEFORE the Christmas holiday cut industrial activity, industry's rate of operations had recovered 93 per cent of the ground lost during the coal strike.

This improvement put STEEL's industrial production index back up to 156 per cent (preliminary) for the week ended Dec. 21, compared with 146 per cent in the week ended Dec. 14, and 127 the low for the coal strike period. Before the coal mine stoppage began, the index had reached a postwar high of 158 per cent of the 1936-1939 average of 100.

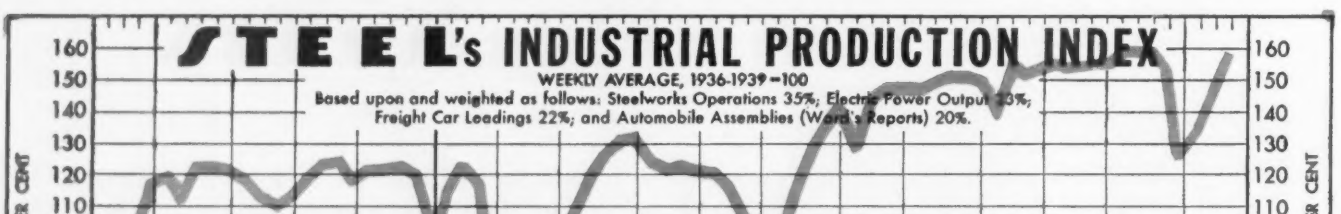
STEEL—Continued recovery of the steel industry's rate of ingot production was a major factor in the rise of the index. Before the Christmas holiday week again lowered operations, steel ingot production had returned to within 6½ percentage points of the postwar high reached just before the coal strike. Heavy pressure for steel continued as consumers sought to obtain as much tonnage as possible before freight rates rise on Jan. 1, to beat price increases, and to build stocks as protection against labor disturbances that may come early in 1947.

NEW ORDERS—A drop in the U. S. Commerce Department's index of value of new orders received by manufacturers suggests that durable goods production may decline in 1947. Notwithstanding increased prices which boost dollar values, the department's index of value of new orders for durable goods fell in October to 246 per cent, an 8 point decline from September. Except for a slight decline midyear the index had been on the upgrade throughout the first nine months of 1946. However, the index of value of new orders for nondurable goods continued on the upgrade through October. Indexes of value of manufacturers' shipments and inventories of durable goods continued upward in October.

BUILDING—November was the fourth consecutive month in which the volume of building for which permits were issued in 215 cities surveyed by Dun & Bradstreet Inc. showed a moderate decline. That month also marked the first time in 15 months that the volume was below that for the corresponding month of the previous year. At $158,079,798, the November volume also was the lowest of the first 11 months of 1946 and also the lowest since September, 1945.

RAILROADS—Advance reports indicate that railroad operating revenues in November were 8 per cent below those of the October estimate. Greatest drop, both in dollars and percentage, was in freight revenues, rather than in passenger revenues. Undoubtedly, a substantial portion of the declines, particularly in freight revenues, resulted from the coal strike, which cut rail operations.

PRODUCTION—Despite the coal strike, production of manufactured goods and minerals continued sufficiently high in November to raise the Federal Reserve Board's industrial production index to a new postwar high of 182 per cent (preliminary) of the 1935-1939 average of 100. The November level exceeded October's by one point.



The Index (see chart above): **Latest Week (preliminary) 156** **Previous Week 146** **Month Ago 152**

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)‡	85	72.5	83.5	80.5
Electric Power Distributed (million kilowatt hours)	4,863†	4,778	4,765	4,239
Bituminous Coal Production (daily av.—1000 tons)	2,202	372	2,091	2,107
Petroleum Production (daily av.—1000 bbls.)	4,750†	4,717	4,810	4,480
Construction Volume (ENR—Unit $1,000,000)	$86.2	$126.9	$77.8	$63.8
Automobile and Truck Output (Ward's—number units)	95,940	96,887	96,461	17,580

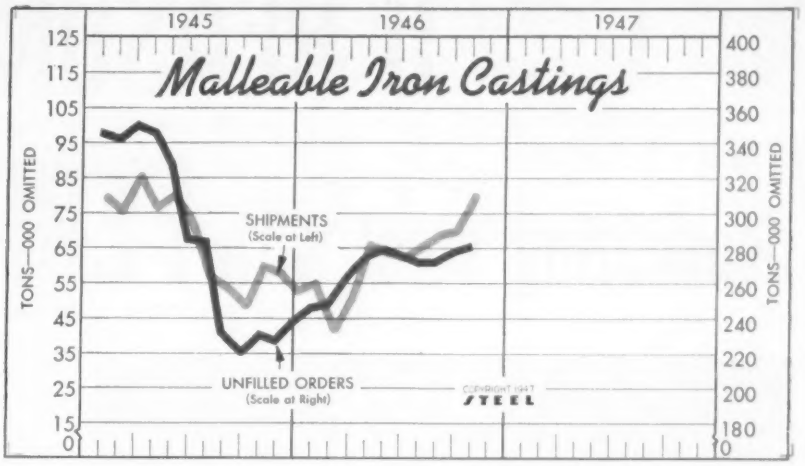
* Dates on request. ‡ 1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons. † Preliminary.

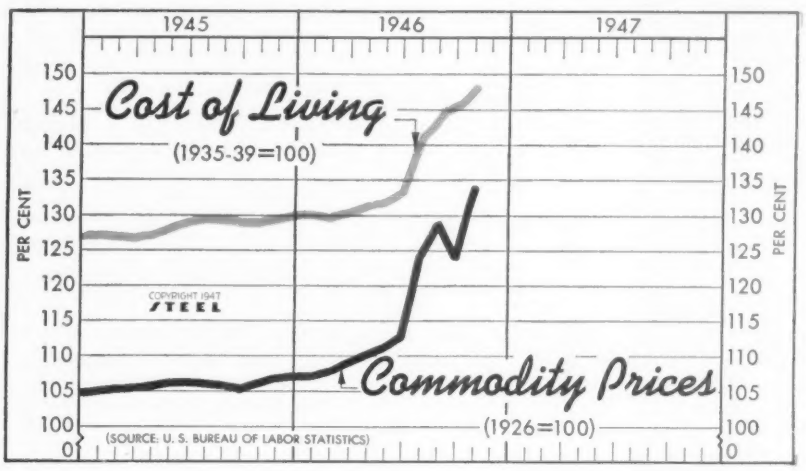
TRADE				
Freight Carloadings (unit—1000 cars)	900†	829	807	688
Business Failures (Dun & Bradstreet, number)	25†	33	24	8
Money in Circulation (in millions of dollars)‡	$29,019	$28,946	$28,689	$28,557
Department Store Sales (change from like wk. a yr. ago)‡	+19%	+19%	+24%	+15%

† Preliminary. ‡ Federal Reserve Board.

Malleable Iron Castings

	Shipments (000 omitted)		Unfilled orders for castings for sale (000 omitted)	
	1946	1945	1946	1945
Jan.	53.7	78.8	246	345
Feb.	40.2	75.2	248	342
Mar.	50.2	85.3	263	350
Apr.	65.0	76.1	275	346
May	62.6	79.6	279	328
June	61.6	72.0	276	285
July	64.4	55.8	272	284
Aug.	67.9	52.6	272	232
Sept.	69.5	47.0	277	220
Oct.	79.4	59.1	281	230
Nov.	...	57.3	...	227
Dec.	...	52.0	...	237





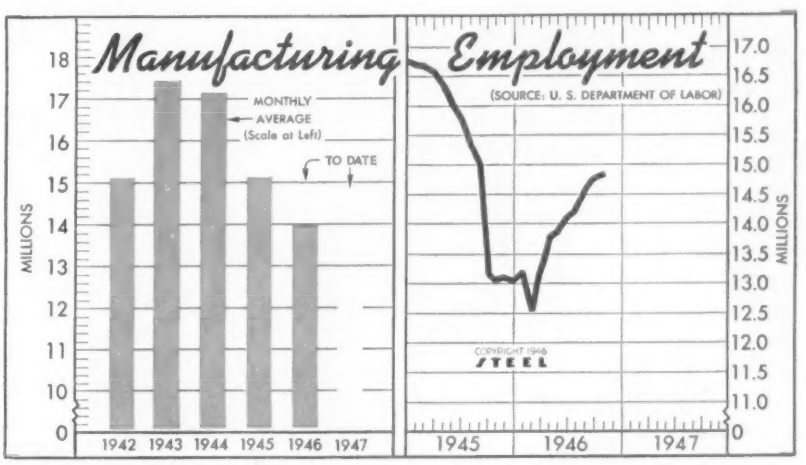
Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1946	1945	1944	1946	1945	1944
Jan.	107.1	104.9	103.3	129.9	127.1	124.2
Feb.	107.7	105.2	103.6	129.6	126.9	123.8
Mar.	108.9	105.3	103.8	130.2	126.8	123.8
Apr.	110.2	105.7	103.9	131.1	127.1	124.6
May	111.0	106.0	104.0	131.7	128.1	125.1
June	112.9	106.1	104.3	133.3	129.0	125.4
July	124.3	105.9	104.1	141.2	129.4	126.1
Aug.	129.1	105.7	103.9	144.1	129.3	126.4
Sept.	124.0	105.2	104.0	145.9	128.9	126.5
Oct.	134.1	105.9	104.1	148.4	128.9	126.5
Nov.	....	106.8	104.4	....	129.3	126.6
Dec.	....	107.1	104.7	....	129.9	127.0
Ave.	....	105.8	104.0	....	128.4	125.5

Factory Employment

(000 omitted)

	1946	1945	1944
January	13,236	16,696	17,587
February	12,536	16,684	17,581
March	13,206	16,557	17,447
April	13,779	16,302	17,235
May	13,885	16,012	17,105
June	14,098	15,749	17,116
July	14,245	15,331	17,091
August	14,578	15,019	17,085
September	14,752	13,159	16,888
October	14,807	13,048	16,758
November	.....	13,110	16,695
December	.....	13,059	16,747
Monthly Ave.	.....	15,060	17,111



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$15,867	$12,010	$13,872	$13,757
Federal Gross Debt (billions)	$259.0	$262.4	$262.2	$278.3
Bond Volume, NYSE (millions)	$28.6	$36.6	$23.0	$30.7
Stocks Sales, NYSE (thousands)	6,973	8,400	5,862	6,667
Loans and Investments (billions)†	$57.6	$57.6	$57.5	$68.0
United States Gov't. Obligations Held (millions)†	$37,572	$37,623	$37,626	$48,817

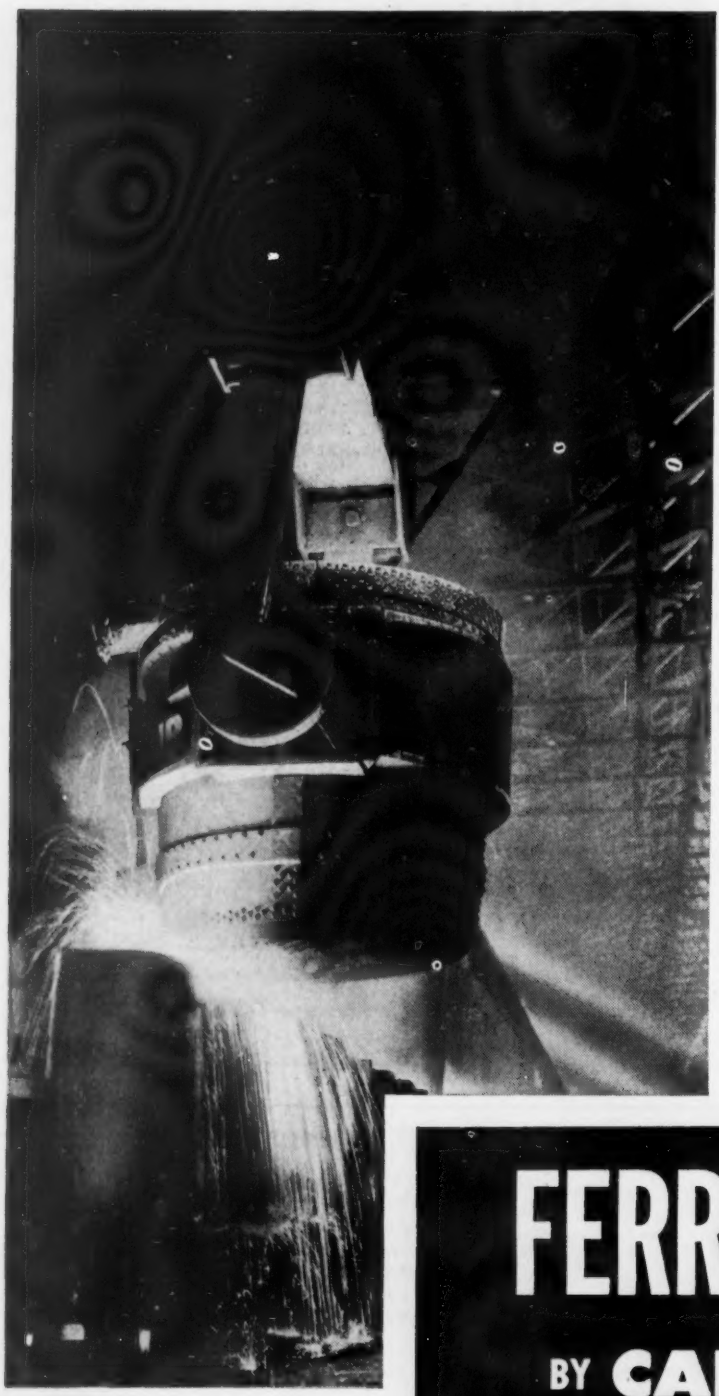
† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$64.91	$64.73	$64.45	$58.27
All Commodities†	139.7	139.1	135.8	106.7
Industrial Raw Materials†	154.3	154.4	152.6	119.7
Manufactured Products†	134.8	134.0	130.4	102.6

† Bureau of Labor Statistics Index, 1926=100.

6 REASONS for deoxidizing steel with FERROCARBO-S



You can count on thoroughly deoxidized steel of superior quality, fewer defective ingots and increased yield that provide worthwhile production economies when you use FERROCARBO-S as the final deoxidizing agent. Summarized, in brief, you will have the benefits of:

1 THOROUGH DEOXIDATION
It is assured by the complete dispersion of the active constituents of FERROCARBO-S throughout the molten steel.

2 PROLONGED INCREASE IN FLUIDITY
This results from the highly exothermic deoxidation reactions plus the greater fluidity obtained through the effective coalescence and elimination of inclusions.

3 REDUCTION IN THE NUMBER OF INCLUSIONS
It is shown by the almost complete elimination of oxide and sulfide stringers and the random dispersion of the few remaining inclusions throughout the microstructure.

4 IMPROVED QUALITY AND INCREASED INGOT YIELD IN FINE-GRAINED STEEL
Ingot heterogeneities are substantially minimized, with fewer defective ingots and improved surfaces assured.

5 INCREASED STRENGTH PLUS IMPROVED DUCTILITY
Forgings and castings, in particular, possess improved longitudinal and transverse physical properties when made from steel deoxidized with FERROCARBO-S.

6 INCREASED HARDENABILITY AND CREEP STRENGTH
The production of sound, clean steel and the coarsening of the grain impart these desirable characteristics to the metal.

It's easy and economical to utilize FERROCARBO-S in either open hearth or electric furnace steels. We will gladly tell you more about uses and advantages. Just write Dept. J-126, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

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BY CARBORUNDUM
TRADE MARK

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HELPFUL LITERATURE

1. Shot Peening

Pangborn Corp.—16-page illustrated bulletin "Shot Peening. . . .What It Means to You" discusses advantages of this modern method of increasing fatigue life of metal parts. Details of shot peening method, suggested applications, shot peening equipment and other phases are discussed.

2. Cemented Carbide

Kennametal Inc.—16-page illustrated bulletin "Characteristics of Kennametal" is treatise on cemented carbides. Descriptions are given of various grades of tungsten-titanium-carbide and tungsten-carbide. Properties, characteristics and suggested applications for tools, dies, wear plates, rolls and other parts are listed.

3. Stock Flanges

Kropp Forge Co.—16-page illustrated bulletin No. 225 is stock flange list. Forged steel flanges in boiler, marine, welding, high hub, double hub, tank, spud, offset and horseshoe types are described. Included are tables showing American Standards for threads, dimensions of wrought pipe, working and bursting pressures of wrought steel pipe and other data.

4. Precision Casting

Kerr Dental Mfg. Co., Industrial Div.—20-page illustrated catalog describes equipment and materials available for industrial precision casting operations. Details of investment casting procedure are outlined. Equipment described includes centrifugal casting machine, induction melting units and vacuum equipment. Precision casting materials are covered also.

5. High Temperature Fans

Michiana Products Corp.—4-page illustrated bulletin No. 645 shows design and construction features of line of fans for high temperature applications which range in capacity from 400 cubic feet of air per minute upward.

6. Materials Handling

Metzgar Co. — 6-page illustrated bulletin "Easy-Flow Production" describes gravity wheel and roller conveyors; power belt conveyors; End-Wood truck and trailer wheels and wheel casters; and cable reel dollies.

7. Screw Machines

Monarch Machine Tool Co.—20-page illustrated bulletin "The Monarch Speedi-Matic" describes design and operating features of this high production, hand operated screw machine which incorporates several new automatic features. Machine is designed to handle small screw machine work in quantities of from 25 to 500 or more pieces.

8. Bench Lathe

Reypro Corp. — 4-page illustrated bulletin "The Model Master" shows features of bench type machine tool which is basically a lathe. Milling machine, drill press and auxiliary shaft attachments can be added to adapt this machine for wide range of tool room and other shop work.

9. Die Casting Machines

Lester-Phoenix Inc.—6-page illustrated bulletin "Die Casting in the Modern Manner" contains brief descriptions and specifications of line of die casting machines for production of zinc, tin, lead, aluminum, brass and magnesium castings.

10. Power Clamping

National Automatic Tool Co.—12-page illustrated bulletin No. 1046 describes hydraulic and electric automatic clamping type fixtures for many work holding applications. How automatic clamping speeds production of drilling, tapping and other machining operations is shown.

11. Cast Iron Welds

C. E. Phillips & Co.—4-page illustrated instruction bulletin provides guidance for making machinable arc welds in gray iron castings. Instructions include current settings, arc manipulation and preheating temperatures. Diagrams, metallographic studies and hardness surveys are used to explain recommended procedures.

12. Controlled Atmospheres

C. M. Kemp Mfg. Co.—18-page illustrated technical bulletin is reprint of three-part analysis entitled 'A Critical Study of Controlled Atmospheres." Use of controlled atmospheres for various heat treatments of ferrous and nonferrous metals and alloys is evaluated. Other factors involved in use of controlled atmospheres are discussed.

13. Conveyor Accessories

Rapids-Standard Co.—2-page illustrated form No. S-142 describes and lists specifications of Rapid-Wheel conveyor Spur Curve which is simple switch device to allow flow of materials from main line to storage or dock and of hinged conveyor section which provides passage through conveyor line.

14. Wire Cloth & Screen

Cambridge Wire Cloth Co.—32-page stock list No. 600 tabulates wire cloth and metallic screen materials which are available for immediate shipment. Data are given on items of steel, galvanized wire, brass, bronze, copper, Everdur, Inconel, Monel, nichrome, nickel and various stainless steel analyses.

15. Welding Electrodes

A. O. Smith Corp.—4-page illustrated bulletin No. 646 is comparison chart of welding electrodes. Selection and application data are included on mild steel, high tensile, stainless steel and hard surfacing welding electrodes. Comparative numbers are given for each manufacturer's line.

16. Spray Booths

Newcomb-Detroit Co. — 16-page illustrated bulletin on water tube spray booths explains working principle and lists complete specifications of this paint spray booth which speeds production finishing of wide range of products.

17. Tractor Track Press

Rodgers Hydraulic Inc.—16-page illustrated bulletin on "Rodgers Track Press" describes this machine which facilitates servicing and repair of crawler type tractor tracks. These mobile and stationary machines remove and install pins and bushings in tracks.

18. Slotter

Rockford Machine Tool Co.—4-page illustrated bulletin No. 404 lists features, advantages and specifications of 20-inch rating, 36-inch stroke Hy-Draulic slotter. Bulletin No. 449 describes 12-inch and 20-inch stroke machines.

19. Magnetic Brakes

Stearns Magnetic Mfg. Co.—20-page illustrated catalog No. 604-D tabulates applications, selection data and specifications of line of magnetic brakes. Information is given on types for floor, motor and machine mounting.

20. Stainless Steel

Timken Roller Bearing Co.—7-page "Stainless Steel Mill Stock List" gives finishes, sizes and types of stainless steel available for immediate shipment from mill stock. Table presents AISI type numbers of company's line of stainless steel.

21. Leather V-Belting

S. R. Sikes Co.—2-page illustrated data sheet gives features and selection data on notched V-shaped leather belting which is available in various standard sections. Lengths can be cut as required and joined by coupler to suit drive needs.

22. Sling Calculator

John A. Roebling's Sons Co.—10 x 3-inch slide rule type "Sling Calculator" simplifies calculations required for selection or correct loading of round wire rope and "Flatweave" slings.

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23. Conveyors

Standard Conveyor Co.—28-page illustrated catalog No. 308 describes gravity and power conveyors which include belt, wheel and roller types. Information is offered on pneumatic dispatching systems. Typical applications in metal working and wide range of other industries are shown.

24. Safety Guard

Standard Safety Equipment Co.—1-page illustrated bulletin describes StaSafe chip guard which can be used on lathes, shapers, grinders and other machines to prevent flying particles and oil from injuring workers. Guard is equipped with replaceable plastic window which affords full vision of work.

25. Gas Meters

Roots-Connersville Blower Corp.—16-page illustrated bulletin No. 40-B-14 presents shop and installation views, sectional drawings, test curves and other data on positive rotary displacement meters for pressures of 25 to 300 pounds per square inch for measuring flow of wide range of gases and fluids.

26. Capacitor Motors

General Electric Co.—8-page illustrated bulletin No. GEA-4443 describes line of fractional and integral horsepower capacitor motors for jet pump drive. Features and advantages of use are discussed. Construction and design details are shown. Connection diagrams and dimensional information are included.

27. Pickling & Washing Machine

B. F. Goodrich Co.—4-page illustrated broadside discusses advantages of spray type pickling and washing machine which is lined with rubber by Vulcalock process. Machine is individually engineered for each specific operation.

28. Hose Couplings

Hose Accessories Co.—20-page illustrated pocket-size handbook covers selection and use of hose couplings, care of hose and other data. Methods of reducing operating costs and increasing efficiency of equipment are set forth.

29. Milling Practice

Kearney & Trecker Corp.—83-page illustrated manual is book 2 of Milling Practice Series and is entitled "A Critical Study of Controlled Attachments." Guidance is given on operation of machine. Principles involved in design and construction of modern milling machine are discussed. Purpose and proper use of attachments are outlined.

30. Steel Building

Great Lakes Steel Corp.—4-page illustrated bulletin entitled "Space at an Economical Price" describes Quonset 40 all-steel buildings which are fire resistant, economical and flexible in use for industrial purposes. Single and multiple arch-rib buildings are shown. Condensed specifications are given.

31. Pneumatic Equipment

Hansen Mfg. Co.—20-page illustrated catalog No. 46 covers complete line of industrial airline equipment. Also described are sand blast cleaner unit, air-liquid spray guns and engine cleaners.

32. High Tensile Steel

Jones & Laughlin Steel Corp.—16-page illustrated bulletin form No. AD-143 gives complete information on Otiscoloy high tensile steel which reduces structural weight, has excellent weldability, resists corrosion, forms hot and cold and resists abrasion.

33. Soldering Iron

Hexacon Electric Co.—2-page illustrated leaflet form No. 140 presents details of Hatchet-type soldering iron which embodies maximum balancing characteristics with minimum of operator fatigue. Other features and information on sizes available are included.

34. Small Electric Plants

D. W. Onan & Sons—12-page illustrated bimonthly publication "Power Points" carries news of interesting installations and applications of company's line of electric generating plants. Typical uses of power plants are shown.

35. Rust Preventives

E. F. Houghton & Co.—8-page illustrated bulletin "Rust Prevention with Houghton's Cosmolines" discusses applications and corrosion resistant properties of nine different types of Cosmolines.

36. Refractory Products

A. P. Green Engineering & Management Co.—4-page brochure outlines purpose and advantages of services which aid refractory and allied clay product manufacturers in exploration and discovery of raw materials, construction of plants, operation of existing plants, compounding mixture for finished products, selection of equipment, and overall operation and management.

37. Hydraulic Presses

Hydraulic Press Mfg. Co.—84-page illustrated bulletin No. 4500 describes line of HPM All-Hydraulic presses for modern pressure forming. Data are given on deep drawing, single action, rubber pad forming, stretch forming, sheet leveling, forging and other presses. Also covered are die casting machines, scrap metal balers, plastic molding presses, injection molding machines and special presses.

38. Structural Material

Haskelite Mfg. Corp.—12-page illustrated booklet entitled "Plan With Plymetl" presents information about line of structural materials that combines metals and wood in various combinations. Methods of fabrication, applications, comparison chart of characteristics, methods of fastening and recommended finishing procedures are outlined.

39. Gas Carburizing Furnaces

Holcroft & Co.—4-page illustrated bulletin entitled "Holcroft Gas Carburizing Furnaces for the Mass-Production Industries" describes design, construction, operation and advantages of this process. Features and applications are outlined.

40. Reproduction Process

Ozalid Div. of General Aniline & Film Corp.—Illustrated booklet entitled "10 Types of Prints Instead of 1" is book of actual samples of Rapid Black, blue, maroon opaque cloth, transparent sepia, transparent cloth, matte foil, Chartfilm and Dry-photo sepia reproductions. Applications and advantages of each type are described.

41. Castings

Meehanite Metal Corp.—60-page illustrated Meehanite metal handbook is description of metallurgy and interpretation of engineering properties of various types of Meehanite metal and their applications in industry. Conversion tables and tabular summary of physical properties of castings are included.

42. Protective Packaging

R. M. Hollingshead Co.—12-page illustrated pamphlet form No. 5559 discusses Cocoon packaging plastic which provides simple, quick and efficient means of packaging parts, assemblies or complete machines regardless of size or complications in shape. Application generally is accomplished with spray gun. Package produced is durable, flexible and impervious to moisture.

43. Circular Sawing Machine

Motch & Merryweather Machinery Co.—12-page illustrated booklet deals with No. 00 circular sawing machine for cutting ¼ to 2-inch stock. Automatic, semi-automatic, power feed and manual types are covered. Triple-Chip saw blades and automatic saw grinding machine are shown as well as larger models of circular sawing machines.

44 Interference Filters

Farrand Optical Co.—4-page bulletin No. 800 presents data on high transmission, monochromatic, narrow band interference filters. They consist of evaporated thin layers of dielectric material between semi-transparent metallic films on glass. Transmission characteristics are shown in graphs.

45. Flow Rate Instruments

Fischer & Porter Co.—8-page illustrated catalog section No. 40-A contains data relating to selection, design and dimensions of variety of flow rate instruments suited for high operating pressures and temperatures. Recording, controlling, integrating, remote and close coupled instrument accessories are shown also.

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Year Closes with Steel Order Backlog at Record High Level

Deliveries extended on many products into third quarter due to heavy demand and year's production disruptions . . . Scrap prices rise further . . . Additional companies revise base prices and extra lists on various products

HANDICAPPED throughout the year by various disruptions and shortages of raw materials, steel producers will enter 1947 with heavy order backlogs. Some companies will have the heaviest unfilled tonnage in their experience. In certain lines, notably sheets, strip, plates and small bars, a number of producers are booked into third quarter.

However, given an opportunity to operate for several months at a high rate, producers believe they can bring supply and demand in fair balance on most products, with the exception of the light gage, flat-rolled products. The supply situation in the latter should begin to ease slightly by the second quarter, as new capacity gets into operation. Included in this new capacity should be added silicon sheet facilities, planned originally for operation last September to relieve one of the most stringent situations in all steel products.

Extended deliveries in practically all types of steel products was one of the chief characteristics of the markets throughout the past year. This was brought about by sustained heavy demand coupled with many interruptions to operations. At the same time, production costs mounted steadily. These basic market factors were not reflected in prices until late in the year when a general overhauling of price schedules got under way.

Among important actions taken last week were establishment by Timken Steel Tube Division of Timken Roller Bearing Co., Canton, O., of a base price of $61 a ton on hot-rolled alloy steel blooms, slabs, billets and of $3.05 per hundred pounds on hot-rolled alloy bars. A revision in extras accompanied this action. Crucible Steel Co. of America issued a new price list, covering base prices and extras on stainless steel products. Pittsburgh Steel Co. advanced bright basic manufacturers' wire $8 a ton and established a new schedule of extras. This company also raised wire rods to a base price of $2.80 for ¼ to 7/32-inch, with a new extra schedule applicable over ¼-inch.

Undertone of the scrap market was especially strong during the past few weeks. Successive advances failed to bring out desired tonnages in many districts and some interests believe the market is headed for still higher levels before stabilizing. Heavy melting steel in the Pittsburgh district is commanding $32.50 a ton, representing an advance of $12.50 a ton since mid-November.

STEEL's composite market average on scrap advanced to $31.08 last week from $30.75 while that on finished steel held unchanged at $64.91; semifinished steel at $41.60; and pig iron at $29.56.

No price changes were recorded last week in major nonferrous metal markets. Undertone of the silver market remained weak, prices declining in the open New York market to 85.75c per ounce.

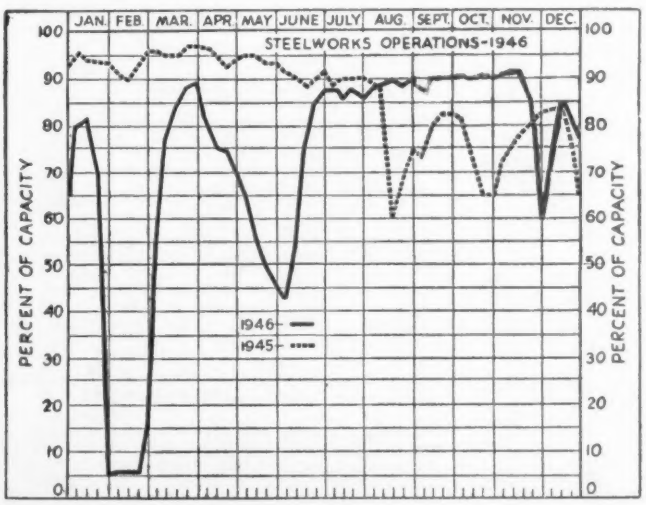
Seasonal factors caused a drop of eight points in the estimated national steelmaking rate to 77 per cent of capacity last week but an immediate recovery to the pre-Christmas rate was assured. Production dropped 13½ points at Pittsburgh to 78.5 per cent of capacity, 16 points to 70 per cent at Chicago, 14 points to 77.5 per cent at Cleveland, 10 points to 75 per cent at Cincinnati, 7½ points to 77.5 per cent at Wheeling, 5 points to 85 per cent in New England, 5 points to 88 per cent in Detroit and 1 point to 77 per cent in the eastern Pennsylvania district. Advances of 3 and 2 points, respectively, were recorded in Youngstown at 70 per cent and in Buffalo at 90.5 per cent. Operations were reported unchanged at 84 per cent in Birmingham and 68 per cent in St. Louis.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Dec. 28	Change	Same Week 1945	Same Week 1944
Pittsburgh	78.5	—13.5	60	79
Chicago	70	—16	67.5	99.5
Eastern Pa.	76	— 1	70	94
Youngstown	70	+ 3	67	83
Wheeling	77.5	— 7.5	70	91.5
Cleveland	77.5	—14	67.5	85
Buffalo	90.5	+ 2	37	93
Birmingham	84	None	85	95
New England	85	— 5	80	87
Cincinnati	75	—10	55	92
St. Louis	68	None	68	75
Detroit	88	— 5	62	79
Estimated national rate	77	— 8	65	92.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.



COMPOSITE MARKET AVERAGES

	Dec. 28	Dec. 21	Dec. 14	One Month Ago Nov., 1946	Threee Months Ago Sept., 1946	One Year Ago Dec., 1945	Five Years Ago Dec., 1941
Finished Steel	$64.91	$64.91	$64.73	$64.45	$64.45	$58.27	$56.73
Semifinished Steel	41.60	41.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	29.56	29.56	29.56	27.50	27.50	24.75	23.00
Steelmaking Scrap	31.08	30.75	24.67	22.22	19.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Dec. 28, 1946	Nov., 1946	Sept., 1946	Dec., 1945
Steel bars, Pittsburgh	2.60c	2.50c	2.50c	2.25c
Steel bars, Philadelphia	2.96	2.86	2.86	2.57
Steel bars, Chicago	2.60	2.50	2.50	2.25
Shapes, Pittsburgh	2.35	2.35	2.35	2.10
Shapes, Philadelphia	2.48	2.48	2.48	2.215
Shapes, Chicago	2.35	2.35	2.35	2.10
Plates, Pittsburgh	2.50	2.50	2.50	2.25
Plates, Philadelphia	2.558	2.558	2.558	2.30
Plates, Chicago	2.50	2.50	2.50	2.25
Sheets, hot rolled, Pittsburgh	2.50	2.425	2.425	2.20
Sheets, cold-rolled, Pittsburgh	3.20	3.275	3.275	3.05
Sheets, No. 24 galv., Pittsburgh	†3.55	4.05	4.05	3.70
Sheets, hot-rolled, Gary	2.50	2.425	2.425	2.20
Sheets, cold-rolled, Gary	3.20	3.275	3.275	3.05
Sheets, No. 24 galv., Gary	†3.55	4.05	4.05	3.70
Hot-rolled strip, Pittsburgh	2.50	2.35	2.35	2.10
Cold-rolled strip, Pittsburgh	3.20	3.05	3.05	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	3.05	2.75
Wire nails, Pittsburgh	3.75	3.75	3.75	2.90
Tin plate, per base box, Pittsburgh	*$5.25	*$5.25	*$5.25	$5.00

* Nominal. † Base changed to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$38.00	$36.00
Slabs, Pittsburgh, Chicago	39.00	39.00	39.00	36.00
Rerolling billets, Pittsburgh	39.00	39.00	39.00	36.00
Wire rods, No. 5 to ⅜-inch, Pitts.	‡2.55c	2.30c	2.30c	2.15c

‡ Base changed.

Pig Iron

	Dec. 28, 1946	Nov., 1946	Sept., 1946	Dec., 1945
Bessemer del. Pittsburgh	$31.77	$29.77	$29.77	$26.94
Basic, Valley	30.00	28.00	28.00	25.25
Basic, eastern del. Philadelphia	31.93	29.93	29.93	27.09
No. 2 fdry., del. Pgh. N. & S. sides	31.27	29.27	29.27	26.44
No. 2 fdry., del. Philadelphia	32.43	30.43	30.43	27.59
No. 2 foundry, Chicago	30.50	28.50	28.50	25.75
Southern No. 2, Birmingham	26.88	24.88	24.88	22.13
Southern No. 2, del. Cincinnati	30.94	28.94	28.94	26.05
Malleable, Valley	30.50	28.50	28.50	25.75
Malleable, Chicago	30.50	28.50	28.50	25.75
Charcoal, low phos., fob Lyles, Tenn.	37.50	33.00	33.00	33.00
Gray forge, del. McKees Rocks, Pa.	30.61	28.61	28.61	25.80
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.00

Scrap

Heavy melting steel, No. 1, Pittsburgh	$32.50	$23.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	40.50	21.90	18.75	18.75
Heavy melting steel, Chicago	30.00	21.75	18.75	18.75
Rails for rolling, Chicago	35.00	22.75	22.25	22.25
No. 1 cast, Chicago	40.00	29.00	23.75	20.00

Coke

Connellsville, furnace ovens	$8.75	$8.75	$8.75	$7.50
Connellsville, foundry ovens	9.50	9.50	9.50	8.25
Chicago, by-product fdry., del.	15.35	15.10	15.10	13.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinishd Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, $33, fob mill; forging quality, $38, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop. $48.69.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41.50; Duluth (billets), $41; Pac. ports (billets), $51.50 (Andrews Steel Co., carbon slabs, $41.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49.50; Duluth, billets, $49; forging billets fob Pac. ports, $59.50.

(Andrews Steel Co., carbon forging billets, $50 gross ton at established basing points.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $63.50; eastern Mich. $64.50.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon, sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, ¼ to ⅜-in., inclusive, $2.55 per 100 lb. Galveston base, $2.65 and $2.80, respectively. Worcester, add $0.10; Pacific ports, $0.535. Pittsburgh Steel Co., $2.80; over ⅜ in., $3; Portsmouth Steel Corp., $2.55; Keystone Steel & Wire Co., $2.70.

Bars

Hot-rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.60c; Duluth, base, 2.60c; Detroit, del., 2.735c; eastern Mich., 2.785c; New York, del., 2.96c; Phila., del., 2.96c; Gulf ports, dock, 2.995c; Pac. ports, dock, 3.285-3.56c.

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.185c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.108	4300	$1.839
2300	1.839	4600	1.298
2500	2.759	4800	2.326
3000	0.541	5100	0.379
3100	0.920	5130 or 5152	0.494
3200	1.461	6120 or 6152	1.028
3400	3.462	6145 or 6150	1.298
4000	0.487	8612	0.703
4100 (.15-.25 Mo)	0.757	8720	0.757
(.20-.30 Mo)	0.812	9830	1.407

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.25c; Toledo, 3.35c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.624c; Detroit, del., 3.759c; eastern Mich., 3.809c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.585c; eastern Mich. and Toledo, 2.635c; Gulf ports, dock, 2.835c; Pacific ports, dock 2.885c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.45c; Detroit, del., 2.585c; eastern Mich. and Toledo, del., 2.635c; Gulf ports, dock, 2.835c.

Iron Bars: Single refined, Pitts., 6.15c; double refined, 7.00c; Pittsburgh, staybolt, 7.85c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.635c; eastern Mich., del., 2.685c; Philadelphia, del., 2.69c; New York, del., 2.72c; Pacific ports, 3.085c.

(Andrews Steel Co. quotes on Middletown, O., base for shipment to Detroit area; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.25c, Sparrows Point, Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.335c; eastern Mich., del., 3.385c; New York, del., 3.54c; Philadelphia, del., 3.56c; Pacific ports, 3.885c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Middletown, base, 3.55c; New York, del., 3.77c; Philadelphia, del., 3.74c; Pacific ports, 4.135c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, not corrugated, copper alloy: Pittsburgh, Chicago, Gary, Birmingham, 4.15c; Granite City, 4.25c; Pacific ports, 4.635c; copper iron, 4.50c; pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c; Pacific ports, 4.335c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.685c; eastern Mich., 3.735c; Pacific ports, 4.235c.

Electrical Sheets, No. 24: (Prices nominal pending revision)

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4.685c	4.00c
Armature	4.25c	5.035c	4.35c
Electrical	4.75c	5.535c	4.85c
Motor	5.425c	6.21c	5.525c
Dynamo	6.125c	6.91c	6.225c
Transformer			
72	6.625c	7.41c	....
65	7.625c	8.41c	....
58	8.125c	8.91c	....
52	8.925c	9.71c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 2.50c; Detroit, del., 2.635c; eastern Mich., del., 2.685c; Pacific ports, 3.185c. (Superior Steel Corp., 3.30c, Pittsburgh.)

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.335c; eastern Mich., 3.385c; Wooster, base, 3.40c. Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel, 0.26-0.50 carbon: Pittsburgh, Cleveland, base, 3.03c; add 0.20c for Worcester.

Tin, Terne Plate

(Maximum nominal tin plate prices permitted under OPA; actual market 25 points lower due to contract comitments. Effective Jan. 1, coke tin plate, $5.75; electrolytic tin plate, 0.25 lb tin, $4.85; tin mill black plate, $3.60; manufacturing ternes, $4.90; roofing ternes, $13.50.)
Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed 4.335c.
Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point, $4.65.
Roofing Ternes: Pittsburgh base per package 112 sheets: 20 x 28 in., coating I. C. 8-lb $12.50; 15-lb $14.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; Geneva, Utah, 2.65c; New York, del., 2.71c; Phila., del., 2.558c; St. Louis, del., 2.74c; Boston, del., 2.86c; Pacific ports, 3.085-3.46c; Gulf ports, 2.885c.
(Granite City Steel Co., carbon plates, 2.65c fob Chicago or Birmingham; Central Iron & Steel Co., Harrisburg, Pa., 3.05c, basing points; Lukens Steel Co., Coatesville, Pa., and Worth Steel Co., Claymont, Del., 2.80c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c, base.)
Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.435c; Gulf ports, 4.135c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.787c; Gulf ports, 4.308c; Pacific ports, 4.525c.
Clad Steel Plates: Coatesville, 10% cladding: nickel clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; Geneva, Utah, 2.50c; New York, del., 2.54c; Phila., del., 2.48c; Pacific ports, 3.035-3.41c; Gulf ports, 2.735c.
(Phoenix Iron Co., Phoenixville, Pa., 3.05c, Bethlehem, Pa.)
Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb; Pacific ports, $3.585.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads	
Bright, basic or bessemer	*$3.05
Spring (except Birmingham)	*$4.00
Wire Products to Trade	
Nails and Staples	
Standard and cement-coated	†$3.75
Galvanized	‡$3.75
Wire, Merchant Quality	
Annealed	§$3.50
Galvanized	§$3.85
(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)	
Woven fence, 15½ gage and heavier	**72
Barbed wire, 80-rod spool	††79
Barbless wire, twisted	††79
Fence posts	74
Bale ties, single loop	72½

* Add $0.10 for Worcester, $0.05 for Duluth Corp., $3.425, Pittsburgh Steel, $3.55, for bright basic.
† Add $0.30 for Worcester, $0.535 for Pacific ports. Nichols Wire & Steel, $4.25; Pittsburgh Steel Co., $4.10.
‡ Add $0.535 for Pacific ports.
§ Add $0.10 for Worcester; $0.735 Pacific ports.
** Pittsburgh Steel Co., 77.
†† Pittsburgh Steel Co., 89.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Welded

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	53	30	½	21	0½
¼ & ⅜	56	37½	¾	27	7
½	60½	48	1-1¼	31	13
¾	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25½	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut length 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Rolled
1"	13	.....	$9.90	$9.36	$9.65
1¼"	13	.....	11.73	9.63	11.43
1½"	13	$10.91	12.96	10.63	12.64
1¾"	13	12.41	14.75	12.10	14.37
2"	13	13.90	16.52	13.53	16.19
2¼"	13	15.50	18.42	15.06	18.03
2½"	12	17.07	20.28	16.57	19.83
2½"	12	18.70	22.21	18.11	21.68
2¾"	12	19.82	23.54	19.17	22.95
3"	12	20.79	24.71	20.05	24.02
3½"	11	26.24	31.18	25.30	30.29
4"	10	32.56	38.68	31.32	37.52
4½"	9	43.16	51.29	.....	.....
5"	9	49.96	59.36	.....	.....
6"	7	76.71	91.14	.....	.....

Pipe, Cast Iron: Class B, 6-in. and over, $65 per net ton, Birmingham; $70, Burlington, N. J.; $67.80, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Rails, Supplies

Rails: Standard, over 60-lb, fob mill, $2.50 per 100 lb. Light rails (billet), Chicago, Birmingham, $2.85 per 100 lb; Pittsburgh, del., $2.875; West Virginia Steel & Mfg. Co., $55 per net ton. Relaying, 35 lb and over, fob railroad and basing points, $31-$33 per net ton.
Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30c-6.40c.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.
(Base prices advanced 12 per cent, effective July 27, 1946; following discounts nominal, effective Dec. 2, pending stabilization of market at higher price level.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1¼ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages, nuts separate, 71-10 off; bulk, 80 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-in. and smaller	..	64
½-in. and smaller	62	..
⅛-in.-1-in.	..	60
⅞-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1¾-in. and larger	56	..

Additional discount of 15 for full kegs.

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham, Lebanon, Pa.

Structural	5.25c
⅞-inch and under	55-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
....	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

	Bars	Plates	Sheets	H.R. Strip	C.R. Strip
CHROMIUM NICKEL STEELS					
302	25.96c	29.21c	36.79c	23.93c	30.30c
303	28.13	31.38	38.95	29.21	35.71
304	27.05	31.38	38.95	25.45	32.46
308	31.38	36.79	44.36	30.84	37.87
309	38.95	43.28	50.85	40.03	50.85
310	53.02	56.26	57.35	52.74	60.50
312	38.95	43.28	53.02	....	....
*316	43.28	47.61	51.94	43.28	51.94
§321	31.38	36.79	44.36	31.65	41.12
†347	35.71	41.12	48.69	35.71	45.44
431	20.56	23.80	31.38	18.94	24.35
STRAIGHT CHROMIUM STEEL					
403	23.93	26.51	31.92	22.99	29.21
**410	20.02	23.93	28.67	18.39	23.80
416	20.56	23.80	29.21	19.75	25.45
††420	25.96	30.84	36.25	25.70	39.49
430	20.56	23.80	31.38	18.94	24.35
‡‡430F	21.10	24.35	31.92	20.29	26.51
440A	25.96	30.84	36.25	25.70	39.49
442	24.35	27.59	35.17	25.96	34.62
443	24.35	27.59	35.17	25.96	34.62
446	29.76	33.00	39.19	37.87	56.26
501	8.66	12.98	17.04	12.98	18.39
502	9.74	14.07	18.12	14.07	19.48
STAINLESS CLAD STEEL (20%)					
(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)					
304	....	19.48	20.56	....	....
410	....	17.31	18.39	....	....
430	....	17.85	18.94	....	....
446	....	19.48	20.56	....	....

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*$8.75
Connellsville, foundry	9.25- 9.75
New River, foundry	10.25-10.50
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00
By-Product Foundry	
Kearney, N. J., ovens	14.40
Chicago, outside delivered	14.35
Chicago, delivered	15.35
Terre Haute, delivered	14.85
Milwaukee, ovens	15.10
New England, delivered	16.00
St. Louis, delivered	†15.10
Birmingham, delivered	12.25
Indianapolis, delivered	14.85
Cincinnati, delivered	14.60
Cleveland, delivered	14.50
Buffalo, delivered	14.75
Detroit, delivered	15.10
Philadelphia, delivered	14.65

* Operators of hand-drawn ovens using trucked coal, $9.35.
† 15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha.	
Pure and 90% benzol	15.00c
Toluol, two degree	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.00c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

WAREHOUSE STEEL PRICES

Base delivered prices, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars†	Structural shapes	Plates	Floor plates	Hot-rolled sheets† (10-gage base)	Hot-rolled strip† (14-gage and lighter, 6-in. and narrower)	Hot-rolled strip† (12-gage and heavier, wider than 6-inch)	Galvanized flat sheets 24-gage base)†	Cold-rolled sheets† (17-gage base)	Cold finished bars	Cold-rolled strip†
Boston	4.356[1]	4.203[1]	4.203[1]	6.039[1]	4.050[1]	5.548[1]	4.418[1]	5.725[13]	5.031[14]	4.656[21]	4.965
New York	4.134[1]	4.038[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.838[14]	4.584[21]	5.075
Jersey City	4.155[1]	4.018[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.890[14]	4.605[21]	5.075
Philadelphia	4.114[1]	3.937[1]	3.875[1]	5.564[1]	3.774[1]	4.664[1]	4.554[1]	5.499[13]	5.139[25]	4.564[21]	5.064
Baltimore	4.093[1]	4.05[1]	3.865[1]	5.543[1]	3.64[1]	4.293[1]	4.193[1]	5.365[17]	5.118[20]	4.543[21]	....
Washington	4.232[1]	4.22[1]	4.067[1]	5.632[1]	3.842[1]	4.432[1]	4.332[1]	5.667[17]	5.007[24]	4.532[21]	....
Norfolk, Va.	4.377[1]	4.303[1]	4.262[1]	5.777[1]	4.037[1]	4.927[1]	4.477[1]	5.862[17]	4.552[24]	4.677[21]	....
Bethlehem, Pa.*	....	3.70[1]	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.70[1]	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.70[1]	....	....	....	....	....	....	....	....
Buffalo (city)	3.60[1]	3.65[1]	3.92[1]	5.55[1]	3.575[1]	4.21[1]	4.11[1]	5.20[15]	4.625[16]	4.20[21]	4.96
Buffalo (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[15]	4.525[16]	4.10[21]	4.60
Pittsburgh (city)	3.60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.327[13]	4.625[24]	4.20[21]	4.70
Pittsburgh (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[13]	4.525[24]	4.10[21]	4.60
Cleveland (city)	3.60[1]	3.88[1]	3.65[1]	5.48[1]	3.575[1]	3.95[1]	3.850[1]	5.347[13]	4.625[24]	4.20[21]	4.70
Cleveland (country)	3.50[1]	....	3.55[1]	....	3.475[1]	3.85[1]	3.750[1]	....	4.525[24]	4.10[21]	4.00
Detroit	3.735[1]	3.987[1]	3.935[1]	5.607[1]	3.710[1]	4.085[1]	3.985[1]	5.526[15]	4.760[24]	4.25[13]	4.985
Omaha (city, del.)	4.32[1]	4.37[1]	4.37[1]	5.97[1]	4.045[1]	4.52[1]	4.42[1]	6.00[15]	5.72[24]	4.945[21]	....
Omaha (country)	4.22[1]	4.27[1]	4.27[1]	5.87[1]	3.945[1]	4.42[1]	4.32[1]	5.90[15]	....	....	....
Cincinnati	3.902[1]	3.983[1]	3.952[1]	5.583[1]	3.671[1]	4.046[1]	3.946[1]	5.296[15]	4.271[24]	4.602[21]	....
Youngstown*	....	....	....	....	....	....	....	4.85[13]	....	....	....
Middletown, O.*	....	....	....	....	3.475[1]	3.85[1]	3.750[1]	5.10[15]	....	....	....
Chicago (city)	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.475[1]	3.95[1]	3.850[1]	5.40[15]	4.425[24]	4.20[21]	4.90
Milwaukee	3.908[1]	3.958[1]	3.958[1]	5.558[1]	3.633[1]	4.108[1]	4.008[1]	5.558[15]	4.583[24]	4.358[21]	5.058
Indianapolis	3.83[1]	3.88[1]	3.88[1]	5.48[1]	3.743[1]	4.118[1]	4.018[1]	5.368[15]	4.793[24]	4.43[21]	5.060
St. Paul	4.092[3]	4.142[3]	4.142[3]	5.742[3]	3.817[9]	4.292[3]	4.192[3]	5.666[15]	4.767[24]	4.852[21]	5.398
St. Louis	3.918[1]	3.968[1]	3.968[1]	5.568[1]	3.643[1]	4.118[1]	4.018[1]	5.622[15]	4.593[24]	4.522[21]	5.228
Memphis, Tenn.	4.296[1]	4.346[1]	4.346[1]	6.071[1]	4.221[1]	4.596[1]	4.496[1]	5.746[15]	....	4.821[21]	....
Birmingham	3.75[1]	3.80[1]	3.80[1]	6.153[1]	3.675[1]	4.05[1]	4.05[1]	5.20[15]	5.077[24]	4.99[21]	5.465
New Orleans (city)	4.358[1]	4.408[1]	4.408[1]	6.329[1]	4.283[1]	4.658[1]	....	5.808[15]	5.304[24]	5.079[21]	....
Houston, Tex.	4.00[3]	4.50[1]	4.50[1]	5.75[3]	3.988[3]	4.668[3]	4.563[3]	5.763[24]	5.819[13]	4.10[21]	....
Los Angeles	4.65[4]	4.70[4]	5.80[4]	7.05[4]	4.95[4]	5.30[4]	5.200[4]	6.55[13]	6.60[4]	6.105[21]	5.868
San Francisco	4.235[7]	4.185[7]	4.185[7]	5.885[7]	4.16[7]	5.885[1]	4.535[1]	6.385[15]	6.91[15]	5.783[21]	7.588
Portland, Oreg.	4.70[27]	4.70[27]	5.00[27]	6.75[27]	4.875[27]	6.65[27]	5.000[27]	6.20[15]	6.825[15]	5.983[15]	....
Tacoma, Wash.	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	....
Seattle	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	....

* Basing point cities with quotations representing mill prices, plus warehouse spread.
† Prices nominal pending establishment of new quotations to reflect mill increases.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.45
Old range nonbessemer	5.30
Mesabi bessemer	5.20
Mesabi nonbessemer	5.05
High phosphorus	5.05

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	18.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.,	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50–8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	$28.30
48% no ratio	31.00
48% 3:1 lump	41.00

Domestic (seller's nearest rail)

48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn	Si	Cr	Ni	Mo	Basic open-hearth Electric furnaces: Bars per 100 lb	Billets per GT	Bars per 100 lb	Billets per GT
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	$0.812	$16.230	$1.353	$27.050
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.812	16.230	1.353	27.050
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.866	17.312	1.407	28.132
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.703	14.066	1.244	24.886
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542

Extras are in addition to a base price of 2.92½c per pound on finished products and $58.45 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

PIG IRON

Maximum prices per gross ton. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.20	32.70	34.20	33.70
Brooklyn, N. Y., del.	34.28	....	....	34.78
Birdsboro, Pa., base	31.50	31.00	32.50	32.00
Birmingham, base	26.88	25.50	31.50	....
Baltimore, del.	32.22	....	....	....
Boston, del.	31.62	....	....	....
Chicago, del.	30.72	....	....	....
Cincinnati, del.	30.94	30.06	....	....
Cleveland, del.	30.62	29.74	....	....
Newark, N. J., del.	32.82	....	....	....
Philadelphia, del.	32.05	31.55	....	....
St. Louis, del.	30.62	31.54	....	....
Buffalo, base	30.50	30.00	31.50	31.00
Boston, del.	36.51	36.01	37.51	37.01
Rochester, del.	32.03	....	33.03	32.53
Syracuse, del.	32.58	....	33.58	33.08
Chicago, base	30.50	30.00	31.00	30.50
Milwaukee, del.	31.73	31.23	32.23	31.73
Muskegon, Mich., del.	34.05	....	....	34.05
Cleveland, base	30.50	30.00	31.00	30.50
Akron, Canton, del.	32.04	31.54	32.54	32.04
Detroit, base	30.50	30.00	31.00	30.50
Saginaw, Mich., del.	32.81	32.31	33.31	32.81
Duluth, base	31.00	30.50	31.50	31.00
St. Paul, del.	33.13	32.63	33.63	33.13
Erie, Pa., base	30.50	30.00	31.50	31.00
Everett, Mass., base	31.50	31.00	32.50	32.00
Boston, del.	32.00	31.50	33.00	32.50
Granite City, Ill., base	30.50	30.00	31.00	30.50
St. Louis, del.	31.00	30.50	....	31.00
Neville Island, Pa., base	30.50	30.00	31.00	30.50
*Pittsburgh, del., N.&S. sides	31.27	30.77	31.77	31.27
Provo, Utah, base	28.50	28.00	....	....
Sharpsville, Pa., base	30.50	30.00	31.00	30.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	31.50	31.00	32.50	32.00
Philadelphia, del.	32.43	31.93	....	32.93
Toledo, O., base	30.50	30.00	31.00	30.50
Cincinnati, del.	33.78	33.26	34.26	33.78
Troy, N. Y., base	31.50	....	....	31.00
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	32.66	32.16	33.16	32.66

* To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.24, Oakmont, Verona; $1.38, Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base)	$36.00
6.51-7.00	$37.00
7.01-7.50	38.00
7.51-8.00	39.00
8.01-8.50	40.00
8.51-9.00	41.00
9.01- 9.50	42.00
9.51-10.00	43.00
10.01-10.50	44.00
10.51-11.00	45.00
11.01-11.50	46.00

Fob Jackson, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $50, Jackson, O.; $53.25 Keokuk, Iowa; $51.25 Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn. $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., Birdsboro, Pa., $36, base; Philadelphia, $37.38, del. Intermediate phosphorus, Central furnace, Cleveland, $33.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point
Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	65.00
Ala., Ga.	65.00
N. J.	70.00

Intermediate Heat Duty

Ohio	57.00
Pa., Ill., Md., Mo., Ky.	59.00
Ala., Ga.	51.00
N. J.	62.00

Low Heat Duty

Pa., Md., Ohio	51.00

Malleable Bung Brick

All bases	75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	42.00
Wire Cut	40.00

Silica Brick

Pennsylvania	65.00
Joliet, E. Chicago	74.00
Birmingham, Ala.	65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	22.00
Bags	26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

Open Market Prices of Leading Ferroalloy Products

(Prices increased, effective Jan. 1. on contract sales, on ferrosilicon alloys; high-carbon ferrochrome; siliconmanganese; chromium, silicon and manganese briquets.)

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $40; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone; Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c, eastern, freight allowed: 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Ferrotungsten: Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9.95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices up 10 cents.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 15.05c, ton lots 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; **high carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, lump packed, eastern zone, freight allowed, c.l. 15.60c, ton lots 16.10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 16.15c, ton lots 16.65c, less ton 17.30c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.05c for smaller lots. Prices are per lb of contained chromium; spot prices 0.25c higher. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.15c; ton lots 21.00c, less ton lots 22.00c eastern, freight allowed, per pound contained chromium, 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 9.50c, ton lots 9.50c less than ton 10.10c, central zone, add 0.3c for c.l. and 0.5c for smaller lots; western zone, add 0.70c for c.l. and 2c for smaller lots. Deduct 0.30c for bulk carlots. Prices per lb of briquets; spot prices 0.25c higher.

Chromium Metal: 97% min. chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c, central 81c and 82.60c; western 82.25c and 84.75c fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract ton lots or more $1.35, less $1.60, pound of metal; $1.36 and $1.61

central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed: 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western, spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk; c.l., 12.50c, 2000 lb to c.l., 13.10c; central 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ½ lb Si eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l. and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. **Ferrosilicon,** weighing about 5 lb and containing exactly 2 lb Si, or about 2½ lb and containing exactly 1 lb Si, packed, eastern zone, c.l. 3.90c, ton lots 4.15c, less ton lots 4.45c; central zone, add 0.15c for c.l. and 0.40c for smaller lots; western zone, add 0.30c for c.l. and 0.45c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.30c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal eastern zone bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c. drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1,89, less $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 8 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11% Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c.

Silvaz Alloy: (Si 35-40%, Ca 9-11% Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, Central; 60.50c, 61.90c and 62.90c, western spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c, central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c and 13.00c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Zirconium Alloy: 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up $5 per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.

Alsifer: Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; less 7.25c. Spot up ½c.

Simanal: Approx. 20% each Si., Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2.60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5:84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5, fob plant freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

OPEN HEARTH AND BLAST FURNACE GRADES

	—Heavy Melting—		No. 1	—Bundles—			Machine Shop	Mixed Borings,	Short Shovel	Cast Iron
	No. 1	No. 2	Busheling	No. 1	No. 2	No. 3	Turnings	Turnings	Turnings	Borings
Pittsburgh	32.50	32.50	32.50	32.50	32.50	32.50	26.00–26.50	26.00–26.50	28.00–28.50	27.00–27.50
Philadelphia	30.50–31.00	30.50–31.00	30.50–31.00	30.50–31.00	30.50–31.00	27.50	20.00	20.00	22.00	20.00
Cleveland	32.50	32.50	32.50	32.50	32.50	30.50	27.00	27.00	27.00	25.00
Buffalo	29.00	29.00	29.00	29.00	29.00	27.00	19.50	19.50	22.00	20.50
*Boston	25.00–26.00	25.00–26.00	25.00–26.00	25.00–26.00	25.00–26.00	23.00–24.00	17.50–18.50	17.35–17.85	20.00–21.00	17.35
Valley	32.50	32.50	....	32.50	....	....	25.00	....	26.00	25.00
Mansfield	....	....	....	....	....	....	§24.00	....	....	....
Chicago	30.00	30.00	30.00	30.00	30.00	28.00	25.00	25.00	28.25	26.00
Birmingham	22.00–22.50	22.00–22.50	22.00–22.50	22.00–22.50	22.00–22.50	20.00–20.50	14.50–15.00	14.50–15.00	16.50–17.00	15.50–16.00
San Francisco	19.50	19.50	19.50	19.50	19.50	10.00	8.00	....	....	....
Cincinnati	27.50	27.50	27.50	27.50	27.50	....	20.20	18.20	22.00	19.00
‡Detroit	27.50–28.00	....	27.50–28.00	27.50–28.00	27.50–28.00	25.50–26.00	20.50–21.00	20.50–21.00	22.50–23.00	22.50–23.00
‡New York	25.50	25.50	25.50	25.50	25.50	23.50	20.50	20.50	22.50	....
St. Louis	22.22	22.22	....	....	....	....	14.72	....	16.72	....
Seattle	17.00	17.00	....	17.00	....	....	9.50	9.50	....	....
Los Angeles	16.50	15.50	....	14.50	14.50	....	8.00	8.00	....	....

ELECTRIC FURNACE, FOUNDRY AND SPECIAL GRADES

	Bar Crops and Plate	Cast Steel	Punchings and Plate Scrap	Electric Furnace Bundles	Heavy Turnings	Alloy Free Turnings	Cut Structural ——and Plate Scrap—— 1 ft and under	2 ft and under	No. 1 Chemical Borings	Tin Can Tin Can Bundles
Pittsburgh	34.50–35.00	34.50–35.00	34.50–35.00	33.00–33.50	31.00–31.50	29.00–29.50	34.50–35.00	34.50–35.00	31.50–32.00	28.00–28.50
Philadelphia	34.50–35.00	34.50–35.00	34.50–35.00	32.00–32.50	31.50–32.00	....	34.00–35.00	34.00–35.00	....	....
Cleveland	35.00	35.00	35.00	35.00	32.50	27.00	34.50	34.50	27.00	24.50
Buffalo	....	27.00	30.00–31.00	28.50	22.50	19.75	28.50	28.50	22.75	....
*Boston	29.35	29.35–29.85	29.35–29.85	29.35	26.35	25.35	28.85	28.85	25.85	....
Chicago	26.25	26.25	26.25	24.75	23.25	....	26.25	25.75	....	....
San Francisco	18.00	18.00	....	....	....	8.00	20.5	20.00	....	17.00
‡Detroit	....	....	28.50–30.50	28.50–29.50	....	....	....	....	....	....
‡New York	....	....	30.00	26.50	....	....	30.00	30.00	24.50	....
Birmingham	24.50–25.00	24.50–25.00	24.50–25.00	....	....	....	24.50–25.00	24.50–25.00	....	....

STEEL GRADES OF RAILROAD ORIGIN

	No. 1 Heavy Melting R.R. Steel	Railroad Malleable	Axles	Rails — Rerolling	Random Lengths	Cut 3-ft. and under	Cut 18-in. and under	Railroad Specialties	Uncut Tires	Angles, Splice Bars
Pittsburgh	33.50	34.00	38.50	35.00	33.00	35.00	36.00	36.00–36.50	36.00	36.00
Valley	23.50	....	....	....	....	....	....	....	....	....
Chicago	30.00	....	....	34.50–35.00	33.00	32.00	33.25	30.50	....	32.00
Cincinnati	28.50	32.00	....	....	....	....	....	....	....	....
St. Louis	....	28.00	27.00	25.00	24.00	27.50	....	....	23.50	23.50
Birmingham	23.00–23.50	....	....	25.50–26.00	24.00–24.50	26.50–27.00	27.50–28.00	....	....	25.50–26.00
San Francisco	....	....	26.50	....	21.00	....	....	....	23.00	....
Seattle	17.00	17.00	....	....	....	....	....	....	....	....

CAST IRON GRADES

	No. 1 Cupola Cast	Charging Box Cast	Heavy Breakable Cast	Stove Plate	Unstripped Motor Blocks	Malleable	Brake Shoes	Clean Auto Cast	No. 1 Wheels	Burnt Cast
Pittsburgh	43.00–44.00	43.00–44.00	43.00–44.00	39.00–40.00	36.00–38.00	40.00–41.00	33.00–34.00	43.00–44.00	38.00–39.00	33.00–34.00
Philadelphia	40.00–41.00	39.00–40.00	39.00–40.00	....	37.50–38.00	39.00–40.00	....	40.00–41.00	40.00	37.00–38.00
Buffalo	35.00–40.00	31.00–35.00	....	33.00–38.00	....	34.00–38.00	....	38.00	32.75–33.25	....
*Boston	38.00–40.00	36.00–38.00	35.00–37.00	36.00	....	....	....	38.00–40.00	....	....
Chicago	35.00–45.00	....	....	....	....	35.00–45.00	....	35.00–45.00	....	....
Seattle	27.50	....	....	23.00	....	....	....	....	24.50	....
Cincinnati	35.00	33.00	32.00	33.00	30.00	....	25.00	34.50	....	....
‡Detroit	35.00–37.00	....	28.00–30.00	....	....	....	....	35.00–37.00	....	....
*St. Louis	25.00–30.00	25.25	22.75	27.00	....	....	20.25	32.00	26.00	20.25
‡New York	37.00–38.00	37.00–38.00	....	....	34.00	32.00	....	....	33.00	....
Birmingham	30.00	....	25.00	28.00	25.00	....	22.75	....	27.00	....
Los Angeles	30.00	....	....	....	....	....	....	....	....	....

* Fob shipping point; † fob tracks; ‡ dealers buying prices; § nominal.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 19.50c, del. Conn.; Lake, 19.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1¼c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c, refinery, 20,000 lb or more; 19.50c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 20.50c; 88-10-2 (No. 215) 24.75c; 80-10-10 (No. 305) 23.50c; No. 1 yellow (No. 405) 16.25c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Price western 10.50c, select 10.60c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 12.35c, chemical 12.45c, corroding 12.45c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 16.62½c; No. 12 foundry alloy (No. 2 grade) 16.37½c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 16.50c; grade 2 (92-95%) 16.00c; grade 3 (90-92%) 15.50c; grade 4 (85-90%) 15.37½c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1¼c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straights, 70.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 69.87½c; Grade C, 99.65-99.79% incl. 69.62½c; Grade D, 99.50-99.64% incl., 69.50c; Grade E, 99-99.49% incl. 69.12½c; Grade F, below 99% (for tin content), 69.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 28.25c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 28.75c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $88-$92 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.50 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.55.

Cobalt: 97-98%, $1.50 lb. for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 85.75c per ounce.

Platinum: $62.50 per ounce.

Palladium: $24 per troy ounce.

Iridium: $120 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35.79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28c, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c, less carlots 26.02c; weatherproof, fob eastern mills carlot 26.42c, less carlots 26.92c; magnet, delivered, carlots, 28.93c, 15,000 lb or more 29.18c, less carlots 29.68c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Full sheets 15.80c, 140 sq ft rolls; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft.
Pipe: Full coils 15.05c; cut coils 15.55c.
Lead Traps and Bends: List plus 35%.

Zinc Products: Sheet fob mill 15.40c, 36,000 lb and over deduct 7%, Ribbon and strip 14.50c; 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 13.25c; 1-3 tons 14.25c; 500-2000 lb 14.75c; 100-500 lb 15.25c; under 100 lb 16.25c. Hull plate (over 12") add 1c to boiler plate prices.

PLATING MATERIALS

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 36.87½c; flat untrimmed, 36.87½c; electrodeposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls. nom., fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb lots; cast and rolled carbonized 51.00c; rolled depolarized 52.00c.

Nickel Chloride: 100-lb kegs or 275-lb bbls 18.00c lb, del.

Tin Anodes: 1000 lb and over nom. del. 500-999 nom.; 200-499 nom.; 100-199 nom.

Tin Crystals: 400 lb bbls nom., fob Grasselli, N. J.; 100-lb kegs nom.

Sodium Stannate: 100 or 300-lb drums nom., del.; tons lots nom.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A, B	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 16.00, auto radiators 13.00, heavy yellow brass 11.50, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 17.25-17.50c; No. 2 copper 16.25c; light copper 15.00-15.25c; refinery brass (60% copper), per dry copper content, 14.87½-15.25c.

DEALERS' BUYING PRICES

(Cents per pound in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.50-12.00, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.25, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 10.75-11.00, battery plates 6.00-6.25, linotype and stereotype 13.00-13.50, electrotype 11.00-11.50, mixed babbitt 12.00-12.50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 5.50-6.00, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 10.00-10.25, old sheets 7.50-7.75, crankcases 7.50-8.00, turnings 4.00-4.25, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.00, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

Sheets, Strip . . .

Stainless steel sheet price schedule revised by an important producer

Sheet & Strip Prices, Page 120

Chicago — Sheetmakers are approaching yearend with substantial backlogs due principally to the recent coal strike. Through the strike an effort had been made to hold sheet and strip output as little affected as possible, but there was considerable loss in production before coal mining was resumed. Customers once more are pressing for deliveries of material promised and are displaying anxiety over how much of the tonnage quota given to them for first quarter will be fulfilled.

New York — While there have been no further changes in sheet prices, some trade leaders look for price revisions in the silicon steels, especially in the lower grades, which under former OPA schedules have been unprofitable for most producers. There have been changes in some of the alloy products, but to date stainless sheet prices have generally remained steady although one important producer revised prices upward last week.

Trading the past few days has included some further priority tonnage. Generally speaking, however, there has been relatively little advance buyng otherwise, reflecting in part the holiday influences. At the same time there has been considerable pressure for tonnage already due in an effort to get it shipped before Jan. 1, when the new freight increases become effective.

Washington — Office of Temporary Controls has revoked its priorities assistance for obtaining sheet steel for the production of tobacco flue sheets used in tobacco crop drying equipment. This order was first issued shortly after the end of the steel strike when a shortage of steel sheets threatened to cut down on the amount of tobacco drying equipment available to farmers.

Philadelphia — Many sheet sellers will have a carryover of old commitments sufficient to provide two months operations. This business, plus rated tonnage, will engage practically their entire first quarter capacity, leaving little for new quotas. In fact, in few cases will new quota tonnage be as large as for even the current quarter, which is relatively small because of previous carryovers.

Cincinnati — Demand for sheets recently has gone to new heights. This is evidenced by inquiries, requests for position on schedules, and appeals for more liberal allocations in the first quarter. The carryover is heavy, especially in cold-rolled, and this is only one evidence of the tight supply situation. The carryover in cold-rolled will amount to more than 30-days tonnage. Priority tonnage, for housing, was held near to fourth quarter volume.

Boston — Affiliation of Atlas Tack Co., Fairhaven, Mass., with the consuming group taking over Apollo Steel Co., Apollo, Pa., brings forward a matter of tack plate supply. The new Apollo management is reported considering tack plate manufacture with 15,000 tons annually rumored as a production goal, or about half of New England's requirements. One steel producer is now supplying all tack plate tonnage and entrance of a new mill would have far-reaching impact on supply and distribution.

Tack plate extras are being revised. Most mills are now quoting 3.40c, Worcester on narrow cold strip, 0.26-0.50 carbon, and revisions in extras represent a more substantial advance in numerous grades. Cold-strip schedules are erratic, depending on hot-rolled strip supply.

Philadelphia — Despite relaxation of many government controls and a temporary suspension of priorities during the recent coal strike, sheet and strip allocations for the first quarter marked the closing days of the year. However, they were generally modest as the great bulk of rated tonnage for the first three months of 1947 had been placed prior to the walkout of miners. This tonnage is principally for housing. Also, 17,000 to 19,000 tons of car steel is reported to have been allocated recently for first quarter delivery. The bulk of this tonnage is special quality plates for a type of tank car in particularly critical demand for the agricultural program. This is the second such directive tonnage to have been placed for tank cars within the past several weeks. The first involved a somewhat larger tonnage for about 1300 cars to be built by two car builders.

Steel Plates . . .

Plate Prices, Page 121

Philadelphia—While most plate mills in this district planned originally to operate at least four days during the past week, at least one eastern mill was scheduled to close down Dec. 25 for the remainder of the week because the men wanted the time off. Meanwhile, backlogs are accumulating at most plate mills, for while demand is off as a result of holiday influences, so also are operations. Some plate producers will enter the new year with practically three months arrearages, and with enough tonnage on their books to keep them going at a normal rate of operations into the third quarter.

New York—Trading in the plate market here reflects seasonal influences. However, most sellers are booked ahead many months. Notable exceptions are two mills which are selling on a quarterly basis and have not as yet opened their books for the second quarter.

Pittsburgh — Leading producer soon is expected to announce revisions in price base and extra card for both plates and shapes. No information is yet available as to extent of increase in either base or extras. Most fabricators are four months or more behind on commitments and order backlogs extend well through 1947 in most instances. Intermittent steel deliveries through most of this year has been major factor in delaying much work on fabricators' books.

Boston—Fully 75 per cent of demand in plates in New England is for tank plates in gages under one-half inch, and it is in these sizes and grade that plate supply is tightest. Indications are plate fabricating shops will be pinched for material through the first quarter with mills generally filled to at least May. Extras involving light gage tank quality steel are being reviewed by some producers. Higher margins might result, it is believed, in higher production and order acceptance for light tank steel. This grade in these gages makes up a substantial ratio of backlogs and carryovers. Deliveries on pressed heads are relatively better than for spun heads, being 10 to 12 weeks against March and June for spun material, depending on sizes.

Seattle — Demand for plates continues active but plants are cautious in making commitments due to the current shortage of steel. Operations are near capacity in this area.

Chicago Bridge & Iron Co. will furnish two 80,000 barrel storage tanks for the Texas Co., Portland, Oreg., the project also involving 15,000 feet of 4 to 12-inch pipe. Flohr Steel Metal Works, Seattle, is building a 150-foot welded steel barge for the Interior Department and the Hydraulic Supply Co., Seattle, has finished an all-welded steel pipe driver for a fisheries company in Alaska.

Steel Bars . . .

Hot-rolled alloy steel bar prices advance to 3.05c, basing points

Bar Prices, Page 120

Pittsburgh—New extra cards on hot-rolled and carbon steel bars reflect an effort on part of producers to make each grade and size stand up profitwise, in contrast to prewar policy which gave little consideration for specific production costs and packaging services rendered. Packaging extras, for example, haven't changed for years and were based on much lower rates and lumber costs.

To many consumers the increases in size, chemistry, quality and tolerance extras will appear exorbitant. However, producers state these extras are based on present day production costs; pointing out that with the exception of relatively small advance granted by OPA this spring, the industry has had no major price relief throughout the war period while production costs have risen sharply.

Some interests believe further minor revisions in the new extra cards may be established, aimed at clarification and remedying specific inequities that may be present. One question, for example, might be: Why should a 3-½-inch and larger round have to take a "killed" steel extra, while a 3-¼-inch round doesn't? There also is some question of when the silicon requirement extra is applicable.

Producers of cold-finished alloy bars who have increased price base from $3.625 to $3.80 per 100 pounds and, as in hot-rolled alloy bars, have dropped the 8.2 per cent increase pattern on both price base and extras which was granted under OPA. The extras for size, quantity, quality and alloying content are the same as on hot-rolled alloy bar schedules.

It will be noted that price base on cold-finished alloy bars has been increased about $1 per ton more than the increase in base price for hot-rolled alloy bars. Cold-finishers state the conversion loss, which averages about 8 per cent, accounts for this action. The increase in price base for cold-finished carbon bars was $2 per ton, same as for the carbon bar price base.

Cleveland — Republic Steel Corp. has established a base price of 3.05c per

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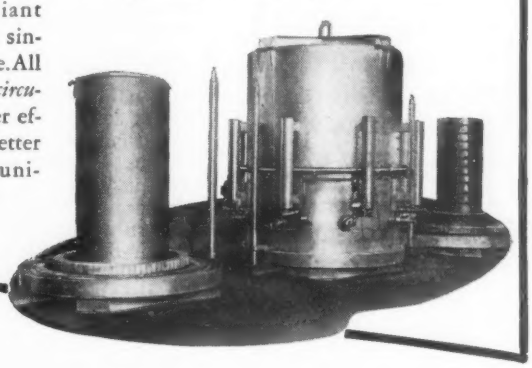

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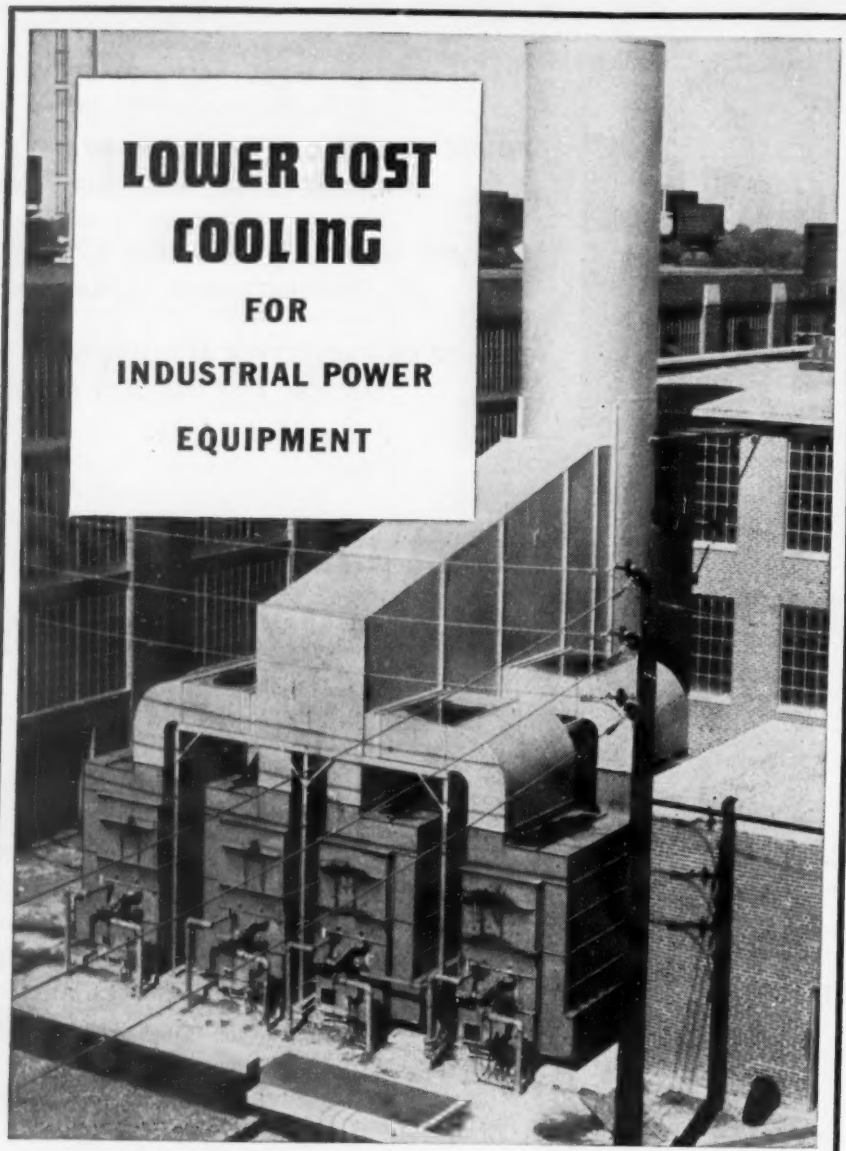

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pound, Canton, Massillon and Buffalo, for hot-rolled alloy bars. At the same time, the company revised its schedule of extras, all effective as of Dec. 26.

Seattle — Rolling mills are on a steady operating basis, their immediate objective being to reduce backlogs which are still of considerable size. Only small orders are being taken for the first quarter. Demand continues strong, especially for warehouse stocks, this item being critical. Many projects are being deferred, either because of unexpectedly high costs or because some building items will be unavailable for months. Lifting of building controls is expected to aid the situation.

Bureau of Reclamation, Denver, Colo., is in the market for 5500 tons of round and square deformed bars, ⅜ to 1¾-inch, bids due Dec. 27. Architects have completed plans for a 400-auto overhead packing deck for Sears, Roebuck & Co., Seattle, a $200,000 project involving an unstated tonnage of reinforcing bars.

Philadelphia—Advances in hot-rolled carbon and alloy bars have become general. Price revisions in cold-finished alloy steel bars are being announced in some quarters. Except for alloy bars, little tonnage can be obtained for shipment in the first quarter.

Chicago — The higher bar prices announced by major producers two weeks ago have been adopted by all mills in this district. This brings base price of hot rolled to $2.60 per hundred pounds, an advance of $2 a ton, with completely revised extras averaging an increase of another $2 a ton. Makers of rail steel bars also have raised prices by the same amount and to the same level. Some revisions in extras for the latter had been made effective three weeks ago and now become part of the new schedules.

Boston — Except for smaller sizes in carbon bars, inventories with consumers are improved and generally ample, although cold-drawn alloys in the same ranges are also tight for first quarter. Consumption being heaviest in carbon stock under one-inch, however, inventories are unbalanced and in numerous instances production of finished products fabricated from bars, is limited to supply and will continue to be through first quarter at least. High carbon file steel demand is being filled at high level, but not without shortages from time to time in certain shapes or sizes within standard shapes. Extras in bars, size and quality, are substantial on considerable tonnage required for this area on Buffalo base. Screw machine products and a large ratio of tonnage required take specifications carrying extras in some degree and form.

Wire . . .

Wire Prices, Page 121

Pittsburgh—Pittsburgh Steel Co. has increased bright basic manufacturers wire $8 a ton to a new price base of $3.55 on which a revised extra card applies. The company also raised wire rods to $2.80 price base, for ¼ to 7/32-inch, with a new extra schedule applicable over ¼-inch. This compares with $2.55 price base established by American Steel & Wire Co. Formerly Pittsburgh Steel had a premium of $7 a ton on smaller rods and $11 on larger sizes. Extra revisions include adjustments in straightening and cutting charges.

Boston—Advance in rods, $5 a ton in base price plus revised extras, is reflected in higher drawn wire prices, although

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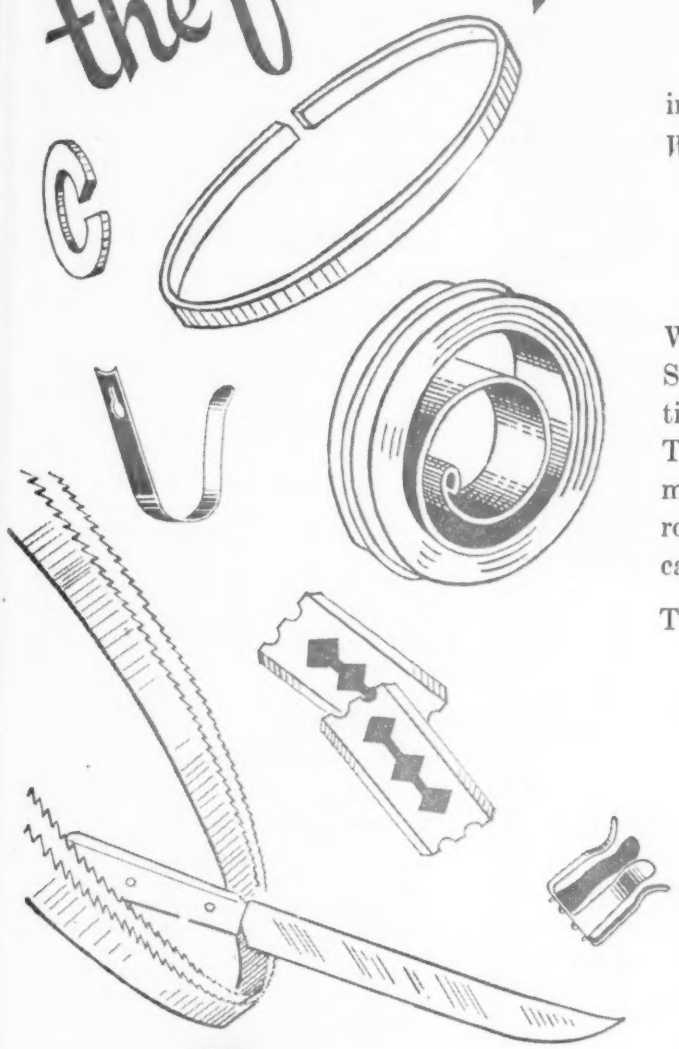

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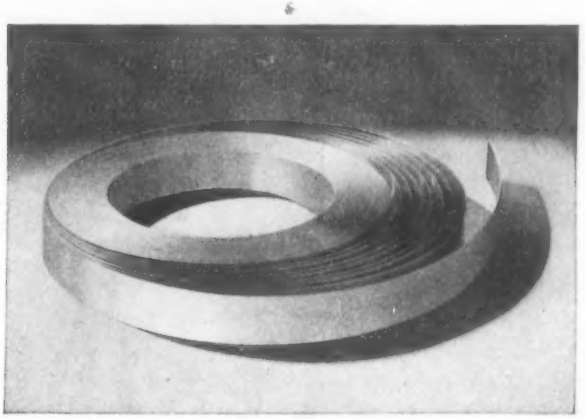

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moves toward higher levels are uneven and attended with confusion. Rod supply continues to be the crux of the tight situation in wire products, especially among nonintegrated producers, with the outlook for an improvement early in the new year doubtful. Mill backlogs in some cases have been drastically revised and considerable old tonnage has been written off. Mill schedules for the next two months are tentatively made up with old orders and carryovers readjusted as to specifications and allocations.

Chicago — Availability of wire and wire products is of more concern to consumers than price, for demand exceeds production by a large margin. Some output was lost during the recent coal strike. Need for electrical wire, wire rope and construction materials is expected to be heavy for at least a year ahead with delivery the dominant concern. No unfavorable reaction resulted from price increases made on merchant products, but since end of the coal strike customers have renewed their pressure for delivery of material promised.

Tubular Goods . . .

Tubular Goods Prices, Page 121

Seattle — New contracts taken for cast iron pipe are scheduled for 1948 delivery, prices being contingent on increases in labor and freight charges. Some shipments now are arriving by water after being long delayed. Inquiry is seasonally affected but the potential market in this area is a major volume.

H. C. Purcell, Seattle, has taken 290 tons of 8 to 12-inch cast iron pipe for Seattle. Bremerton, Wash., opened bids last week for 450 tons. Several other projects are pending. Ellensburg, Wash., has placed 275 tons of cast iron pipe with Purcell and 100 tons of steel pipe with Pacific Water Works Supply Co., Seattle.

Tin Plate . . .

Tin Plate Prices, Page 121

Washington—Restriction on use of tin plate have been removed by the Office of Temporary controls. Government regulations previously had channeled the major portion of tin mill output into the production of cans for perishable and essential foods. Use of cans is now permitted for coffee, beer, shortening and a number of other food products previously banned. Nonfood products for which tin plate is now permitted on an unlimited basis include turpentine, polishes, paints, liquid soap and roofing cement. These products previously were on a quota basis for tin plate.

Pittsburgh—Regulations governing the use of tin containers for packaging food and nonfood products have been dropped by OTC. The industry now can use 0.025-pound electrolytic containers for items having a moisture content less than 12 per cent; 0.50-pound electrolytic for over 12 per cent moisture content. Restrictions on size of containers and amount of tin coating used are retained. 1947 tin plate requirements are estimated as follows: 3.4 million tons for domestic containers coming under order M-81; 250,000 for caps and closures; 125,000 for Canada; 400,000 for export; and 100,000 for miscellaneous applications. These 1947 requirements total about 4.3 million tons against estimated

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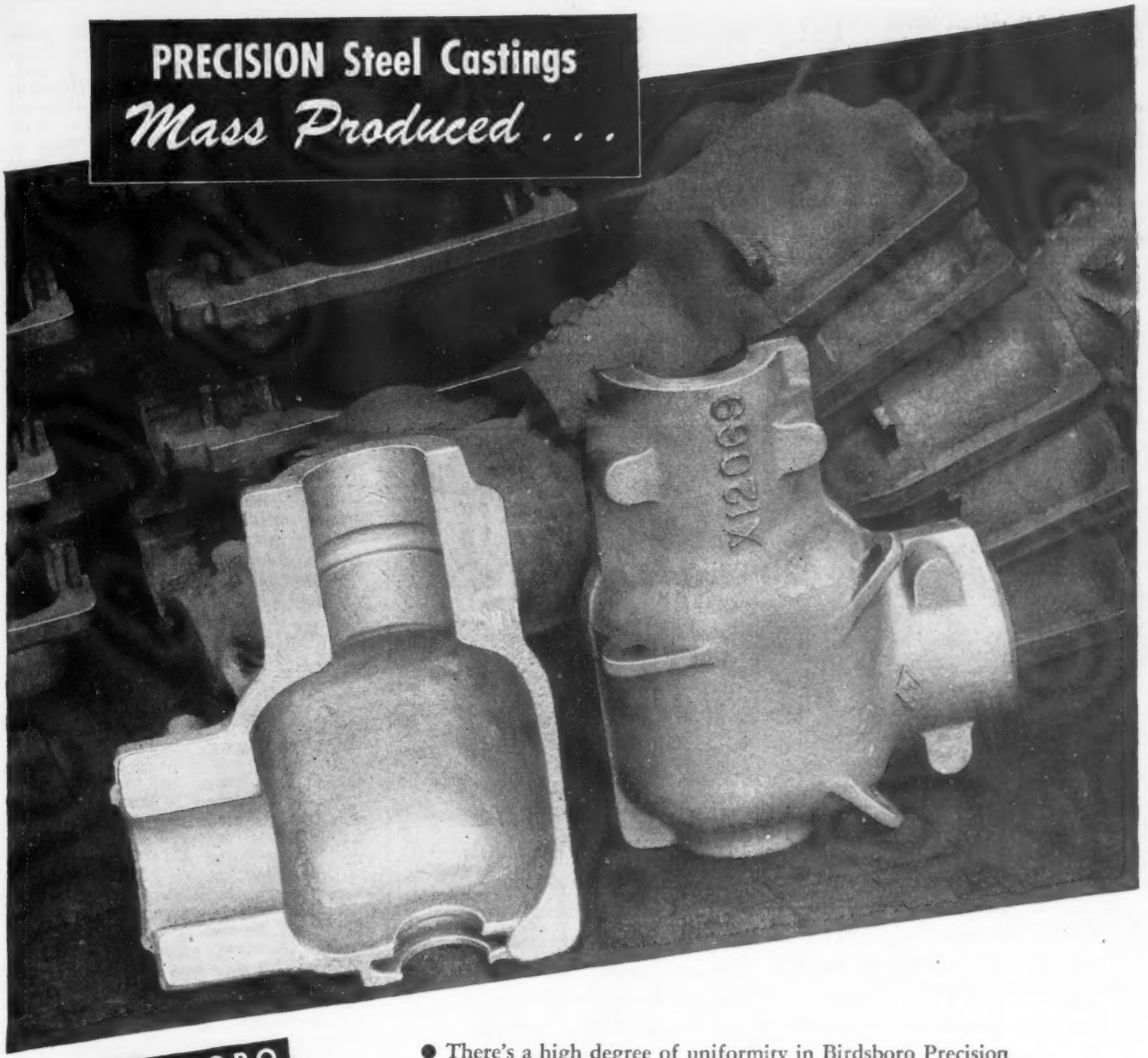

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output of 3.8 million. Some trade officials believe 1947 estimated tin plate needs are "watered" somewhat.

Chicago — Tin plate producers last week welcomed announcement by OTC that the tin container order M-81 was being amended to remove tin plate controls which previously channeled the major part of output into production of cans for essential and perishable food. Once more tin plate makers will have a free hand in determining distribution of their production. This, plus the fact that higher prices on both hot dip and electrolytic plate become effective Jan. 1, will enable mills to operate on a more orderly and profitable basis next year. Despite box car shortage, local plants are getting a sufficient number to keep shipments moving.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 121

Chicago — Higher prices amounting to $2 per ton and increased extras averaging another $2 a ton have been universally adopted on both new billet and rail steel reinforcing bars. This follows action of a major producer on billet bars two weeks ago. Both billet and rail steel are now at $2.45 per hunderd pounds base, Chicago. With elimination of $5 per ton discount to jobbers and fabricators, the latter figure their costs are up about $7.50 a ton and have revised quotations accordingly. Awards and inquiry for reinforcing material are at low volume and no improvement is anticipated until early in 1947.

New York — Several thousand tons of reinforcing steel are active here, with Wilcox Construction Co., Morris Bein and N. Fish low jointly on the general construction of the Jacob Reiis Housing project on Manhattan for municipal housing authority, involving 4000 tons, and Merritt Chapman & Scott, low on the veterans hospital at Peekskill, N. Y., involving 3000 tons. New bids will be asked in January on the Marcy housing project of the Municipal Housing Authority in Brooklyn, N. Y. involving 4000 tons. Plans are under way for a large veterans hospital in the Oranges of northern New Jersey, requiring several thousand tons of reinforcing steel.

Boston—For engineering work, an increase in reinforcing bar prices will approximate $10 a ton for fabricated bars delivered to jobs in most cases, probably slightly higher with the new freight rates at some points. Nearby stocks of concrete bars are limited and volume is mainly in small lots. Contractors frequently have to shop widely to fill requirements, several suppliers furnishing small lots for one contract. Under the circumstances, bar fabricators are unwilling to commit ahead on sizable tonnage.

Structural Shapes . . .

Structural Shape Prices, Page

New York — Featuring structural demand is a Connecticut state bridge over the Connecticut river, between Saybrooke and Lyme, involving 6000 tons of structurals and 2000 to 3000 tons of steel piling. Bids are to be opened Jan. 20. Sanderson & Porter, this city, it is now revealed, have recently closed on 3000 tons for a power plant for the West Penn Power Co., Courtney, Pa., to Bethlehem Steel Co., Bethlehem, Pa. Recent awards have been light, but considerable work is in prospect, especially now that limitations are being eased on nonhousing construction. However, there is still hesitancy because of rising costs and one large housing project here has been held up indefinitely due in part to this reason. This is the Lillian Wald housing project of the Municipal Housing Authority, involving 7000 tons.

Boston—Two or more structural fabricators are frequently called on to supply small lots for wanted delivery; two split 52 tons for a machine shop addition, Universal Winding Co., Providence district. This stems from lack of light structural material with fabricators and warehouses; latter are drained of small sizes by shops estimating mostly on warehouse prices. Near-future improvement in plain material is doubtful, although extensions in standard mill deliveries individually are spread four to six weeks with some eastern Pennsylvania units generally in best position due to flexibility factor. Total steel requirements for a Connecticut river plate girder bridge, closing Jan. 20, exceed 6500 tons and awards include 1000 tons, power plant addition, New Haven, but overall inquiry is down as are new contracts.

Chicago—Activity in structural shapes has dropped off progressively since the coal strike and no pronounced return is anticipated before early next year. Fabricators are more concerned now with getting delivery of plain material from mills than in figuring on new business. Output of shapes lost during the strike has caused further hardship to

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structural shops, which already were short on material promised under quotas. Feeling is that mills soon will announce higher prices, but this is causing little concern. The construction industry still is awaiting full interpretation of the President's order easing controls over building, for there is confusion over what types of construction will be approved.

Philadelphia — Most leading shape sellers have as yet taken no action in revising prices, although the matter is under review and some changes not only in extras but in base prices may be announced in the near future.

Heavy pressure remains for light sections for equipment assemblies and the like, also for light building construction. Jobbers still complain of inability to obtain as much tonnage as they desire. There is a moderate amount of heavy work which should expand as time goes on. Lifting of many restrictions on non-housing construction will contribute to this expansion, although further advances in costs will hold up various projects.

Seattle — Fabricating shops report some materials are now arriving by boat but shipments are far below current requirements. Demand is still strong although it is the off-season and numerous orders have been declined due to the critical supply of materials. Inventories are extremely low.

Isaacson Iron Works, Seattle, has booked about 750 tons in miscellaneous small jobs, 200 tons for a state underpass at Bellevue, Wash., and 100 tons for a Northern Pacific freight depot at Missoula, Mont. American Bridge Co. has taken two Bureau of Reclamation, Denver, Colo. contracts; one at $203,314 for a pumping plant at Grand Coulee dam, and the second at $130,413 for steel involved in a warehouse at the same location. The first contract involves six reverse flow coaster gates, each weighing 50 tons.

Pig Iron . . .

Pig Iron Prices, Page 123

Washington — Office of Temporary Controls has ordered pig iron producers to cancel any December carryovers of unfilled certified orders. Rated orders include housing products and railroad brakeshoes. OTC said most manufacturers have similar orders placed for January delivery and the net effect of the action is to allow producers to get up to date in their order scheduling.

Chicago — Foundries in this district continue to adjust operations according to supply of pig iron. Some run their shops only a few days a week and others have closed for brief periods. Having remained in production as long as iron held out during the coal strike, inventories were worked down to almost the vanishing point and now production can be maintained only by new shipments. Sellers are under pressure from consumers to expedite shipments. Inland Steel Co. still has idle two of the blast furnaces banked during the coal strike, but was planning to get the basic stack running again by weekend. It has not yet scheduled the other which was making foundry iron for the veteran housing program.

Philadelphia — Two district merchant pig iron furnaces are expected to be in full operation by Jan. 1, with consumers generally anticipating less difficulty in

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obtaining tonnage than during the month now closing. The situation should be further eased by a better flow of scrap which is now resulting from the substantially higher prices put into effect recently.

Cincinnati — Shipments of pig iron are a bit tardy, and tonnages moved this month may be below the level in recent months. Holiday shutdowns, for varying periods, may cut the melt to a point which will, in fact, balance up the slower movement of iron. Coke suppliers are slowly recovering from the coal strike.

Boston — Price structure for pig iron is out of pattern. Only Mystic maintains the Everett, Mass., base; with other furnaces shipping fob, delivered costs are higher to consumers of outside iron, more than $4 a ton at some points for Buffalo tonnage. Coupled with higher scrap and other factors, costs for castings have increased around two cents per pound with some melters of outside iron. This is reflected in higher quotations for castings. Currently Mystic is selling at lowest prices; that furnace is operating with a $12 per ton subsidy, due to expire in late Spring, and only this government-paid premium apparently prevents a substantial advance in the Everett base. Distribution of rated tonnage, 4000 tons this month and probably fully as much next, means readjustments in original shipping schedules, but some "free" tonnage is going to melters, generally in single car lots. Shortage of iron is still critical, notably basic at two steel plants while foundries, forced to curtail by lack of raw material, will not be back at former levels until next month.

Buffalo—Unexpected delays in the relighting of furnaces shutdown during the coal strike, has further aggravated a tight merchant pig iron market. One leading producer managed to get one of two idle units back in action last week, but the clamor for iron is not being met in many instances. Complaints from foundries are piling up and considerable shopping around is reported. Otis Elevator announced plans to discontinue operations of its local steel foundry next month because tripling of capacity during wartime had made commercial operation unprofitable.

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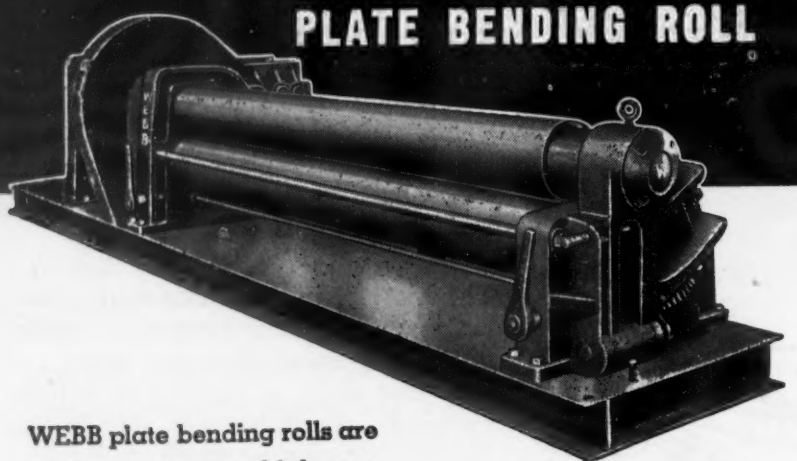

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Warehouse . . .

Warehouse Prices, Page 122

Pittsburgh — Steel distributors have established a price base for city delivery of $4.85 per 100 pounds on cold-rolled and $4.05 on hot-rolled bars. For country delivery, the price base remains 10 cents lower. The new price base for hot-rolled strip in all widths is $4, with size extras applying. Since most mills have established a consistent policy in basing prices on U. S. standard thickness classifications, distributors are confronted with the decision of whether or not to change specifications to gage or decimal equivalents of the U. S. standard system in working off present inventory. Higher warehouse prices are expected momentarily for plates, shapes and cold-rolled strip.

Boston—Warehouse stocks in this district are badly out of balance and prospects for heavier tonnage from the mills in the first quarter are clouded. Distributors have been unable to get firm orders placed on a considerable tonnage asked for, while demand for steel from warehouses is heavy. Products in ample supply are larger cold-finished bars, stainless, welding rods and most alloys. Flat-rolled products, structurals and small carbon bar stock are short of demand.

Rails, Cars . . .

Track Material Prices, Page 121

Pittsburgh — In addition to upward adjustment in price base on standard rails, some revisions in extras also have been established. Standard lengths are now 39 feet, with shorts; without shorts the length extra is 10 cents per 100 pounds. For lengths 33 or 30 feet with shorts, the extra is 10 cents; without shorts, 20 cents. Special cut lengths 39 feet, other than 33 or 30 feet, the extra is 35 cents.

Quantity extras have been revised with 500 net tons or more as base, in contrast with former base of 200 net tons.

In range less than 500 to 300 net tons, the extra is 2.5 cents per 100 pounds; less than 300 to 200 tons inclusive, 5 cents.

The new extra card has a separate listing for "special sections, quality and use extras," which includes an extra for crane rail sections of $1 per 100 pounds. An extra of 5 cents is charged for oiling rails. Extra for additional branding, stamping or marking in excess of AREA or ASTM specifications can be obtained upon application but will not be less than one cent per 100 pounds.

Quality extras for joint bars have been established on a new base of 50 net

tons or more of one section and one punching; formerly the base was 25 net tons or more. For less than 50 to 25 net tons inclusive there is now a charge of 10 cents per 100 pounds. Weight and special section extras also have been established for joint bars.

New quantity extras now apply on tie plates, with base 50 net tons or more in contrast to old schedule of 20 net tons or over; new series of tonnage ranges for these extras now apply as is case of tie rails and joint bars. Special section, weight, and punching extras also are listed for tie plates. Maximum of the range specified now determines the carbon extra .

Washington — Office of Temporary Controls has ruled that no freight car builder shall place any order for steel which is to be used in the production of freight cars for export, on orders received after Nov. 30, 1946, unless such builder has a written authorization from CPA. Freight cars awaiting repairs totaled about 67,294 units on Nov. 1, or about 4 per cent of all cars available for service. This represents a net reduction of 15,514 "bad order" cars or about 18 per cent of the backlog existing in July. Production of new freight cars has not progressed as rapidly as had been anticipated, CPA said.

New York — While few freight cars have been placed recently, considerable business is in prospect, car builders declare. Complications with respect to obtaining steel and certain other raw materials make delivery promises difficult and this undoubtedly is restricting some buying. Furthermore, prices on steel and other raw materials are in such a state of flux that there is some delay on that score also. Locomotive buying includes 62 steam locomotives for the Turkish State Railways, placed with the Vulcan Iron Works, Reading, Pa.

Pipe . . .

Pittsburgh — Sharp increase in prices for rounds in smaller size ranges soon is expected to be reflected in higher tubing prices. Babcock & Wilcox Tube Co., Beaver Falls, Pa., has announced new cash discount terms of half of 1 per cent instead of 2 per cent. The revision was effective Dec. 21 and applied on all tubular products the company makes. Other producers are expected to put into effect similar terms. Producers are booked through first quarter on carbon tubing, while alloys are obtainable late next quarter. Cast iron pipe interests' order backlogs extend 12 to 15 months and despite heavy demand producers have not substantially increased output due to acute pig iron shortage. Cast iron pipe prices are up $5 per ton, reflecting higher pig iron prices and other production costs.

Semifinished Steel . . .

Semifinished Prices, Page 120

Canton, O. — Effective Dec. 23, an increase in the base price and extras on hot-rolled alloy steel blooms, slabs, billets and bars, produced by the Timken Steel Tube Division was announced by the Timken Roller Bearing Co. The new base price is $61 a ton on blooms, slabs and billets and $3.05 per hundred pounds on hot-rolled bars.

Company officials also announced that effective Dec. 23, the cash discount on all products of Steel and Tube Division will be ½ of 1 per cent.

Cleveland — Republic Steel Corp. has established a new base price, effective as of Dec. 26, at $61 per gross ton for alloy billets, slabs and blooms at Canton, Massillon and Buffalo.

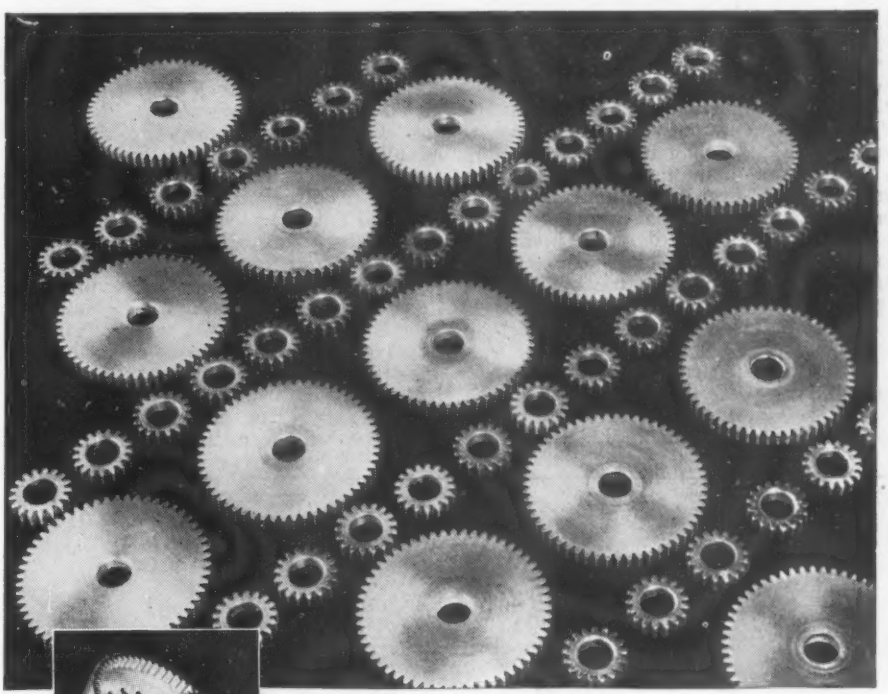
Pittsburgh — Shipments of wire rods, billets, forging ingots and other semifinished steel items to nonintegrated steel interests are now back to precoal strike level. Sheet bar supply-source for operation of Apollo Steel under the new syndicate arrangement apparently has been assured, but no information is available as to price being paid. Prices for alloy billets, bloom and slabs appear to be established at $61 per gross ton as result of the action taken by Crucible Steel Co. of America recently, with Carnegie-Illinois Steel Corp. expectetd to follow.

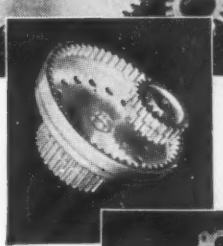
Pittsburgh Steel Co. has increased its wire rod price $5 a ton to $2.80 base. This compares with $2.55 base established by American Steel & Wire recently. Under OPA Pittsburgh Steel was permitted to charge a $7 per ton premium.

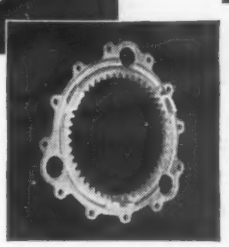
Refractories . . .

Refractories Prices, Page 123

Pittsburgh — Extensive relining programs for blast furnaces, open hearths and coke ovens are expected to substantially augment overall refractory de-







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mand through 1947. The exceptionally heavy requirements makes it impossible to make much headway against order backlogs, which range up to about eight weeks on standard items and six months on special shapes. Typical of large contracts for steel industry's modernization programs are those recently announced by Koppers Co. for Carnegie-Illinois at Clairton, Weirton Steel Co., Weirton, W. Va.; Bethlehem Steel at Johnstown; Jones & Laughlin, Aliquippa; and at Wheeling Steel, Follansbee and Crucible Steel Co.'s plants.

Supplies of Copper, Lead and Tin Expected To Remain Short in First Half; Silver Eases

New York—Shortages in copper, lead and tin mark start of 1947 and no early easing in the supply of these metals may be expected. While copper may become more plentiful by the second half, this is by no means certain. Partly due to reduced world supply, domestic shortages of lead and tin may continue even after copper becomes better balanced.

Copper—Copper is confronted by unpredictable elements fraught with uncertainities in production, distribution and prices. The government stockpile is running out. Before long imports required to round out domestic production to meet demand, estimated around 130,000 tons a month, must be negotiated by private industry. Peak domestic production might account for close to 100,000 tons monthly, probably a too optimistic figure, but in any event balance or deficit must be made up with foreign copper.

Unless the 4 per cent excise tax is suspended, price of the metal will rise sharply late next quarter to levels producers agree will be far too high. But in negotiating for foreign copper, domestic buyers are confronted with world bidding which has already forced prices up to highest levels. Obviously, depletion of government stocks, on which the duty was suspended, world competition, and the four percent tariff are major factors ahead of refiners and consumers of copper shapes.

Demand for copper in 1947 is estimated at 1,550,000 tons against an estimated 1,400,000 tons in 1946 when 1,200,000 tons was foreseen. Incidentally, all the more optimistic calculations for 1946 backfired. Five months of strikes, maldistribution, price uncertainities and increased world competition for copper threw out all estimates for this year. Any recurrence of these adverse influences would further upset predictions, if any, for 1947. To be settled also is the premium price plans, under sharp attack from some directions.

Lead—Office of Temporary Controls has scrapped wartime restrictions on the lead industry. The action ends present limitations on the quantity of lead various industries may purchase or use. The

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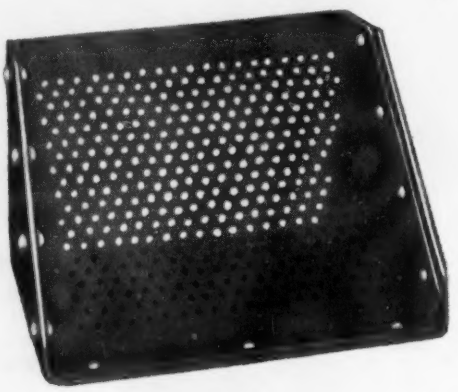

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Production of Pig Iron Declines in November

New York — Production of pig iron declined slightly in November to 4,434,711 tons from 4,814,561 in October, making the total for the year to date 41,344,055 tons against 49,844,086 tons in the like 1945 period, according to the American Iron & Steel Institute. Of the totals, ferromanganese and spiegel accounted for 50,086 tons last month and 475,345 tons for the first 11 months. The industry operated at 80 per cent of capacity during November and 67.1 per cent for the year to date.

Iron Ore . . .

Iron Ore Prices, Page 122

Cleveland—Shipments of Lake Superior iron ore in December totaled 247,083 tons compared with only 71,035 in the same month a year ago, according to the Lake Superior Iron Ore Association, this city. Of last month's total, 167,271 tons came from the port of Superior, 46,814 from Marquette, and 32,998 tons from Two Harbors.

Total shipments for the season dropped for the fourth consecutive year to only 59,356,716 tons, a decline of 16,358,034 tons or 21.6 per cent from the 1945 total of 75,714,750. This season's total is the smallest for any year since 1939 when 45,073,052 tons were shipped and compared with the all-time high of 92,076,781 tons in 1942. The 1946 total excluded 60,610 tons of western manganese ore which was loaded with Lake Superior iron ore during the season and was included in the monthly figures for May to October, inclusive.

Crucible Steel Revises Stainless Steel Prices

New York—Crucible Steel Co. of America has simplified its price schedules on stainless steel products. The new price list, covering base prices and extras, eliminate the complex calculations previously made necessary by the application of the 8.2 per cent increase. The revised prices will approximate previous prices and are effective on shipments made on and after Jan. 1.

Scrap . . .

Scrap Prices, Page 124

New York — Dealers' buying prices are becoming more stable here. Material has been moving much more freely as a result of recent increases—increases that have carried the market on melting steel to well more than $10 a ton above former OPA ceiling prices—and consumers are pressing less actively for material although they are still interested in building up inventories before the increase in freight rules becomes effective Jan. 1.

No. 1 and No. 2 heavy melting, No. 1 busheling, and No. 1 and No. 2 bundles are quoted $25.50 while No. 3 bundles are quoted $23.50; mixed borings and turnings and machine shop turnings, $20.50; and short shovel turnings, $22.50. Electric furnace bundles are quoted $26.50; cut structural and plate scrap, $30 on all sizes; No. 1 chemical borings, $24.50. No. 1 cupola scrap and charging box scrap are quoted $37 to $38

while No. 1 wheels are $3 higher at $33.

Chicago—Although steel mills are trying to hold purchases of open hearth scrap to the $30 price which two weeks ago they agreed to pay, demand for material and short supply are combining to create pressure that may result in a higher price. Because of this situation, short-term contracts of 30-day are predominating and sellers are displaying utmost caution. There is still no indication that higher prices, resulting from two substantial boosts, are producing increased flow. Thus, the heavy demand seems likely to support the higher price level for some time to come. Activity centers mostly in open hearth material. Last week several secondary grades, previously in confusion, became stabilized, but a number of grades still are bringing undetermined prices.

Buffalo—Contracts for 10,000 tons of heavy melting steel, placed this week by a second consumer at $29 a ton, delivered Buffalo, added fuel to the excitement in scrap trade circles. The same mill was reported bidding $23 a ton for alloy-free machine shop turnings, but no business was confirmed at this higher level. One leading dealer characterized the situation as hysterical, with higher prices failing to bring out a flood of tonnage. Railroad scrap was generally $4 a ton higher. Dealers quoted a wide range on foundry items, with No. 1 cupola ranging from $30 up to $40 fob shipping point.

Cincinnati — Scrap iron and steel prices are higher here, dealers and brokers advacing quotations to protect supplies from nearby markets. The situation is unsettled, and the trend is still upward on small sales. Supplies are a bit easier, but not in volume to permit stocking. Volume of scrap coming into this market is increasing, although most interests concede that tonnage this winter cannot meet the demand, unusually heavy because of the shortage of pig iron and other factors. Scrap inventories vary widely. Some mills and foundries have fair stocks, and in position to resist, as they are doing, the upward price trend. On the contrary, other melters are on a hand-to-mouth basis. Yard stocks are low.

Philadelphia — While still buoyant, scrap prices are beginning to level off. Within the past few days there has been only a relatively small increase in melting steel grades and firmer resistance to the uptrend in cast grades is being shown by some consumers. Small foundries in urgent need of tonnage are still paying high premiums on an occasional carlot, but the large buyers appear to have reached their top offering prices, at least for the present, and apparently are getting a fair amount of material. To date the market has been favored by good weather.

Seattle — Activity in the scrap market here is quiet with sellers showing indifference to increased prices and being content to wait. Mills are constantly dipping into inventories and hoping for improvement. Scrap is none too plentiful and dealers in the interior are handicapped by winter weather.

Plans Completed for Scrap Convention in New York

Plans have been completed for the 19th annual convention of the Institute of Scrap Iron & Steel Inc., to be held at Hotel Commodore, New York, Jan. 6-7-8. An extensive speaking program has been arranged, subjects to be discussed covering all phases of industry activity.

Coming at a time when scrap is in short supply and prices are tending sharply upward, expectations are the meeting will be one of the largest in the institute's history.

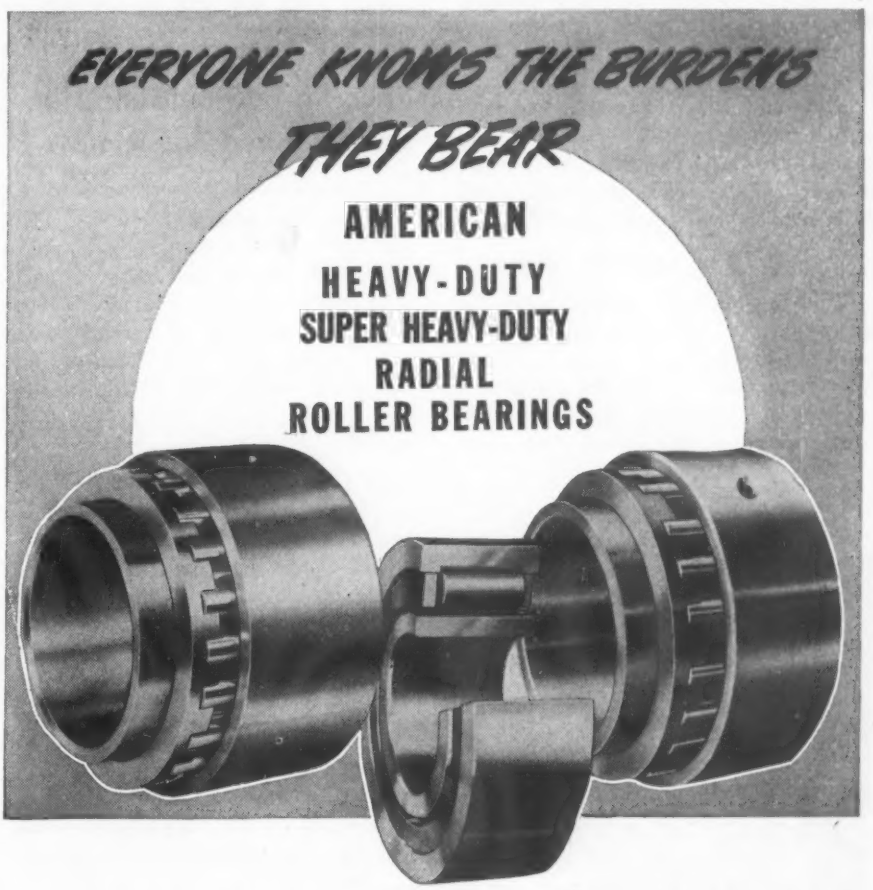
Shortage of Scrap Seen Limiting Steel Production

(*Concluded from Page 36*)

ries are particularly close on cast and railroad scrap and no improvement is predicted before February or March. On other items they are staying out of the market as far as is possible without risking a shutdown. Local mill inventories are somewhat better due to scrap accumulations during a number of production interruptions this year. Scrap brokers and melters both are optimistic prices soon will be stabilized under the free forces of competition now working.

Prices Leveling Off in East

Philadelphia — While heavy melting steel grades are slightly higher, prices are tending to level off. Sharp advances of two weeks ago have brought out con-



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siderable material and some trade leaders doubt if melting steel prices will go much higher in the near future.

Cast grades still are buoyant. Leading consumers are paying around $40 to $41 delivered, but small buyers have paid higher prices. Charging box cast and heavy breakable cast are up about $1, now holding at $39 to $40 delivered. Stove plate is nominal, with much of this material being worked in with heavier grades. Unstripped motor blocks are up 50 cents to $37.50 and $38. Malleable is particularly scarce and is up $3.50 to $39 and $40.

Two leading consumers of No. 1 chemical borings have withdrawn from the market temporarily. It is possible they may resort to a substitute product which would not require chemical borings.

With the market at present high levels—highest since 1917 for melting steel grades—there is a disposition on the part of consumers and sellers to go more slowly in making their commitments.

Increases Fail To Bring Volume

Chicago—Markedly higher prices for scrap—60 per cent over wartime OPA ceilings—are failing to produce volume to meet demand for melting material.

Some steel producers are unable to restore operations to pre-coal strike level because scrap is not available. Several open hearths have not resumed for this reason. The deficiency comes partly from the fact that mills outside this territory are coming into this market for heavy melting steel, and partly to the fact that the exceedingly rapid price rise of the past several weeks has disrupted normal flow. It is reported that as prices have zoomed upward to $30 for heavy melting, some tonnages have changed hands two or three times.

Inventories of steel and cast iron grades are low and with winter at hand consumers are wary of dipping too heavily into them. Until prices become stabilized, it will be difficult to tell whether a more even flow can be expected or maintained.

Price Spread Between Hot, Cold-Finished Bars Holds

(*Concluded from Page* 42)

ing have been increased and method of application revised. Size range classifications with appropriate extras for magnetic testing have been established. When material is specified or required to be annealed, stress or strain relieved, normalized or heat treated, the 10 cents per 100 pounds physical testing extra is not applicable.

The new treatment extra card includes an extra for normalizing (stress or strain relieving) of 75 cents per 100 pounds; annealing, 90 cents; spheroidize annealing, $1.50; and $1.50 for double treatment when annealing and normalizing are both specified. These extras are applicable only to acceptable sizes, lengths and grades.

Cold-drawn, ground and polished-turned, ground and polished-turned and polished extras are now based on a carbon maximum of 0.28 per cent and have been sharply increased notably in smaller size ranges. Extra for ground and polished from cold-drawn rounds of standard manufacturing tolerances with carbon 0.28 per cent maximum of range and under now is $28 per 100 pounds in size range ⅛-in. to less than 5/32-in., compared with former extra of $12 based on carbon 0.30 per cent mean and under.

Extras for chamfering (for automatic screw machine use only) have been revised in part as follows: Rounds 3/16 to less than ¼-in. to 75 cents per 100 pounds, against 25 cents; ¼-in. to less than 7/16-in., 60 cents compared with 20; 1-in. to 2 1/16-in., 20 cents against 0.065 cents; 2 1/16-in. and larger, 10 cents compared with 4 cents. Similar increases in the smaller size ranges are noted for hexagons and squares.

Extras for packaging also have been increased substantially. New extras have been established for bundling for specified weights under 6000 pounds, averaging about 15 cents higher for all weight ranges. There is no longer a minimum burlapping charge of 50 cents per 100 pounds per item or order. For burlapping ends, 25 cents per 100 pounds is now charged; burlapping, full length, 50 cents. An extra of 15 cents is now charged for wrapping coils—rounds, squares, and hexagons. Boxing extras for domestic orders have been increased 50 cents to $1 per 100 pounds. Minimum boxing charge is now $10, against $1.25 per item or order.

Extras for accuracy are now based on 0.28 per cent maximum carbon range, and have been increased for cold-finished rounds, hexagons and squares (all sizes), also flats. A new size range has been established for accuracy extras on rounds. The accuracy extras for rounds do not apply where the accuracy for which the extra is quoted in the same or greater than the standard manufacturing tolerances for the section ordered.

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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3100 tons, bearing piling, Smith Bluff, Tex., for Pure Oil Co., to Carnegie-Illinois Steel Corp., Pittsburgh.

3000 tons, power plant, West Penn Power Co., Courtney, Pa., through Sanderson & Porter, New York City, to Bethlehem Steel Co., Bethlehem, Pa.

1425 tons, transmission towers, Milwaukee, for

Wisconsin Electric Power Co., to Bethlehem Steel Co., Bethlehem, Pa.

1050 tons, DuPont plant addition, Niagara Falls, N. Y., to Bethlehem Fabricators, Bethlehem, Pa.

865 tons, H-piling, stockhouse No. 5, Milwaukee, for Blatz Brewing Co., to Carnegie-Illinois Steel Corp., Chicago; Thompson-Starrett Co. Inc., contractor.

400 tons, addition to Chesapeake & Ohio car shops, Russell, Ky., through Hughes-Foulkrod Co., Philadelphia, to Pittsburgh Bridge & Iron Works, Pittsburgh.

400 tons, warehouse, Grand Coulee dam, Odair, Wash., for Bureau of Reclamation, Denver, Colo., to American Bridge Co., Pittsburgh.

350 tons, bridge, Philadelphia Electric Co., Norristown, Pa., to Phoenix Bridge Co., Phoenixville, Pa.

300 tons, reverse coaster gates for Grand Coulee dam, to American Bridge Co., low at $203,314.

280 tons, bridge, Sec. 202V-F, Madison county, Ill., for State Highway Commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids Nov. 15.

200 tons, state undercrossing, Bellevue, Wash., to Isaacson Iron Works, Seattle.

150 tons, sub-station, Pennsylvania Power & Light Co., Sunbury, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

100 tons, including reinforcing, Oregon state highway bridge, to Tom Lillebo, Reedsport, Oreg.

100 tons, Northern Pacific Railway, freight depot, Missoula, Mont., to Isaacson Iron Works, Seattle; J. C. Boespflug, Seattle, general contractor.

100 tons or more, mill building, Southern Paperboard Corp., Port Wentworth, Ga., to Ingalls Iron Works, Birmingham; Daniel Construction Co., Greenville, S. C., general contractor.

100 tons, shapes and bars, machine shop addition, Universal Winding Co., Cranston, R. I., to A. O. Wilson Structural Co., Cambridge, Mass.; J. H. Tower Co., Providence, R. I. and Truscon Steel Co., Boston; Gilbane Construction Co., Providence, general contractor.

Unstated, warehouse, 300 x 133 feet, Grand Coulee dam, to American Bridge Co., low at $130,412.

STRUCTURAL STEEL PENDING

8000 to 9000 tons, including 2000 to 3000 tons of piling, Connecticut state bridge over Connecticut river between Saybrook and Lyme, bids Jan. 20.

7000 tons, Lillian Wald housing project, Municipal Housing Authority, New York city, postponed indefinitely.

5000 tons, Franklin Exchange building, Oakland, Calif.

2000 tons, generating station, Dayton, O., for Dayton Power & Light Co.

2000 tons, bridge, Liberty Bend, Mo., for U. S. Engineer.

1400 tons, warehouse, Cincinnati, for H. & S. Pogue Co.

1125 tons, Columbia river bridge, North Port, Wash., for Bureau of Reclamation, Denver, Colo.

1050 tons, plant addition, Niagara Falls, N. Y., for E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.

715 tons, 13 state bridges, Maine; Phoenix Bridge Co., Phoenixville, Pa., low on 11 units, or 560 tons; Fort Pitt Bridge Works, low on Gouldville bridge, Presque Isle, 105 tons; American Bridge Co., low on Gardner project, 50 tons.

500 tons, Pennsylvania Railroad bridge over Chartiers Creek, Rosslyn, Pa., bids closed Dec. 26.

500 tons, sheet piling, jetties, Lincoln Park, Chicago, for Chicago Park District; bids Dec. 23.

250 tons, Chicago, for Atchison, Topeka & Santa Fe Railroad.

265 tons, plant addition, Owens Illinois Glass Co., Toledo, O., Hughes-Foulkrod Co., engineers in charge.

160 tons, buildings, Villanova College, Philadelphia, McCloskey & Co., that city, general contractors in charge.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1250 tons, superstructure, building KK, diesel engine plant, Peoria, Ill., for Caterpillar Tractor Co., to Bethlehem Steel Co., Bethlehem, Pa.; S. N. Nielsen Co., Chicago, contractor; bids Nov. 21.

REINFORCING BARS PENDING

5500 tons, ⅜ to 1¾-inch, reclamation projects; bids to Bureau of Reclamation, Denver, Colo., Dec. 27.

850 tons, tunnel, Champaign, Ill., for University of Illinois; no bids to invitation of Aug. 3; new bids asked Jan. 6.

195 tons, Hords Creek dam and reservoir, Texas; bids Jan. 6, U. S. engineer, Galveston.

150 tons, floodwall. St. Mary Parish, Louisiana; bids Jan. 7, U. S. engineer, New Orleans; also 99,500 square feet steel sheet piling.

105 tons, substructure, fixed highway bridge over Calumet river at 130th St., Chicago, for Department of Public Works; bids of Dec. 5 returned unopened, subsequently recalled; Great Lakes Dredge & Dock Co., Chicago, low on general contract.

Unstated, $200,000 overhead parking deck, for Sears, Roebuck & Co., Seattle; bids pending; Young & Richardson, Seattle, architects.

PLATES . . .

PLATES PLACED

Unstated, two 80,000 barrell storage tanks, Portland, Oreg., for the Texas Co., to Chicago Bridge & Iron Co.

Unstated, 150-foot welded oil barge for Interior Department, to Flohr Steel Metal Works, Seattle.

Unstated, all-welded steel pipe driver, for Alaska fish plant, to Hydraulic Supply Co., Seattle.

PIPE . . .

CAST IRON PIPE PLACED

290 tons, 8 to 12-inch, for Seattle, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

275 tons, 6 to 12-inch, Ellensburg, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

450 tons, Bremerton, Wash., bids in.

STEEL PIPE PLACED

100 tons, Ellensburg, Wash., to Pacific Water Works Supply Co., Seattle.

RAILS, CARS . . .

LOCOMOTIVES PLACED

100 locomotives, Poland, financed by Export-Import Bank and to be delivered beginning September, 1947; 40 each to Baldwin Locomotive Works, Eddystone, Pa., and American Locomotive Co., New York; and 20 to Lima Locomotive Works, Lima, O.

International Great Northern, 1 Diesel-electric locomotive, to the Electro Motive Division, General Motors Corp., LaGrange, Ill.

Kansas City Public Service, 1 electric locomotive, to General Electric Co., Schenectady, N. Y.

Turkish State Railways, 62 steam locomotives, to the Vulcan Iron Works, Reading, Pa.

LOCOMOTIVES PENDING

Washington Terminal Co., six 1000 horsepower diesel electric switching locomotives; bids Jan. 2, room 415, 15 N. 32nd St., Philadelphia, contract 1-1946.

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CONSTRUCTION AND ENTERPRISE

ALABAMA

FAIRFIELD, ALA.—Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, plans expansion of local tin mill, consisting of 72 buildings. Alterations to 18 present buildings will cost approximately $469,200; extension and expansion to 12 present mill buildings, to cost $1,109,200; extensions to present office building, to cost $13,500; repairs to one building, $192,300; new mill building, to cost $2,228,800; and new office building, $52,300.

CALIFORNIA

GLENDALE, CALIF.—Williams Radiator Co., 1822 Dana St., plans construction of factory addition to cost $12,000.

LOS ANGELES—Diamond Machine Tool Co., 3429 E. Olympic Blvd., plans construction of 116 x 91-foot factory addition, to cost $35,000.

LOS ANGELES—Marine Engineering & Supply Co. will construct warehouse building at 2430 E. 223rd St., Dominguez District, which will provide an area of 32,200 square feet, to cost $105,000.

COLORADO

DENVER—Continental Oil Co., Continental Oil Bldg., has plans to enlarge and modernize oil refinery plant, at a cost of $4 million.

IDAHO

BOISE, IDAHO—Bureau of Reclamation, Department of the Interior, Washington, has awarded $683,942 contract to Southwest Welding & Mfg. Co., Alhambra, Calif., for Anderson Ranch dam equipment. Contract provides for one 15-foot diameter welded plate steel penstock header, a manifold, and three 90-inch diameter penstocks, including flanges and fittings. Dam and reservoir are under construction on the south fork of the Boise river, 40 miles southeast of here.

INDIANA

FT. WAYNE, IND.—Hoagland Foundry Inc. has been organized to conduct a general foundry business, by Alfred J. Bahr, Charles H. Waterman, Estalla Smith Colter, M. A. Griebel, Henry Moldthan, Louis Kaiser, N. E. Kroenemann, Louis H. Braun, John H. Colter, Gordon H. Webber, Paul Koenemann, Fred K. Andrews, John F. Witte, and E. H. Hoenemann.

INDIANAPOLIS—Enterprise Iron & Fence Co. recently suffered damage estimated at $55,000 to its paint and machine departments as the result of a fire.

INDIANAPOLIS—Dunn-Gandolf Co. Inc., 320 N. Delaware St., has been organized with 100 shares of no par value to manufacture machinery, by Ervin L. Dunn, Stewart A. Gandolf, L. P. Dunn and Doris Gandolf.

IOWA

ALTA, IOWA—Alta Municipal Electric Plant has awarded the contract for improvements to R. V. Leary Co., 311 Securities Bldg., Des Moines, Iowa, for $101,424. Included in the contract is furnishing and installing a 1000-kw diesel engine generating unit and auxiliaries.

MUSCATINE, IOWA—Fruitland Mfg. Co. is erecting a one-story, 60 x 200-foot factory building. Local labor is being used on a subcontract basis.

KANSAS

WICHITA, KANS.—Fruehauf Trailer Co., R. W. Jacobs, secretary, 10940 Harper St., Detroit, has awarded general contract for trailer service depot, 3600 N. Broadway, to Collins Construction Co., 912 Baltimore St., Kansas City, Mo., for an estimated $100,000.

MARYLAND

BALTIMORE—American Cooperage & Steel Drum Co., 141 N. Kresson St., Morris Latinsky, partner, plans adding new mill work department to present plant.

BALTIMORE—Lenderking Metal Products Inc., Arthur L. Nelson, 1000 S. Linwood Ave., has plans completed for erection of storage structure on property adjoining plant, 2811 Dillon St.

CEDARHURST, MD.—Congoleum-Nairn Inc., Alver E. Sprinkle, manager, has received CPA approval for construction of 60 x 700-foot addition, to cost $3,200,000.

SPARROWS POINT, MD.—Bethlehem Steel Co. has obtained CPA approval for construction of power plant, to cost $1,802,338. Over-all cost of the plant, including equipment, is estimated at $9,168,245. The new plant is to be used to increase capacity of the existing hot strip mill, cold sheet mill and cold tin plate mill. Approximately 60,000 kilowatts of additional current will be generated.

MICHIGAN

BIRMINGHAM, MICH.—McClure-Porter Co. Inc., 5091 Rochester Rd., Rt. No. 2, has been organized with $50,000 to conduct a general manufacturing business, by William V. McClure, 270 W. Saratoga Ave., Ferndale, Mich.

DETROIT—Barrett Distributing Co., 17300 John R St., has been organized with $50,000 to manufacture and install heating equipment, by Arthur F. Clifford, 258 Louise Ave., Highland Park, Mich.

DETROIT—Detroit Machine Tool & Accessory Corp., 3205 Barlum Tower, has been organized with $50,000 to manufacture jigs, tools, gages and dies, by Charles A. Cherry, 4137 Arlington Ave., Royal Oak, Mich.

LANSING, MICH.—Lansing Engineering Co., 311 American State Bank Bldg., has been formed with $150,000 to design electrical and electronic devices, by Thomas F. Keegan, 1035 N. Capitol Ave.

MUSKEGON, MICH.—Strom & Strom Inc., 1770 Sixth St., has been formed with $300,000 to engage in a contracting and engineering business, by Elmer A. Strom, R. No. 2.

OXFORD, MICH.—Oxford Metal Products Co. Inc., 29 Oxford St., has been organized with $50,000 to manufacture automotive parts and machine tools, by Peter S. Perkuchin, 29 Gage St., Pontiac, Mich.

PETOSKEY, MICH.—Petoskey Plating Corp., 1117 Buckley Ave., has been organized with $70,000 to conduct a decorative metal finishing business, by Anthony J. Zaremski, R.F.D. No. 3.

RICHMOND, MICH.—Standard Steel Buildings Inc. has been organized with $50,000 to engage in a building construction business, by Joseph C. Ernest.

SAGINAW, MICH.—Safety-Scrape Corp., 608 Bearinger Bldg., has been organized with 50,000 shares of no par value stock to manufacture machinery and mechanical devices, by W. Earl Bassett, 1102 E. Main St., Lansing, Mich.

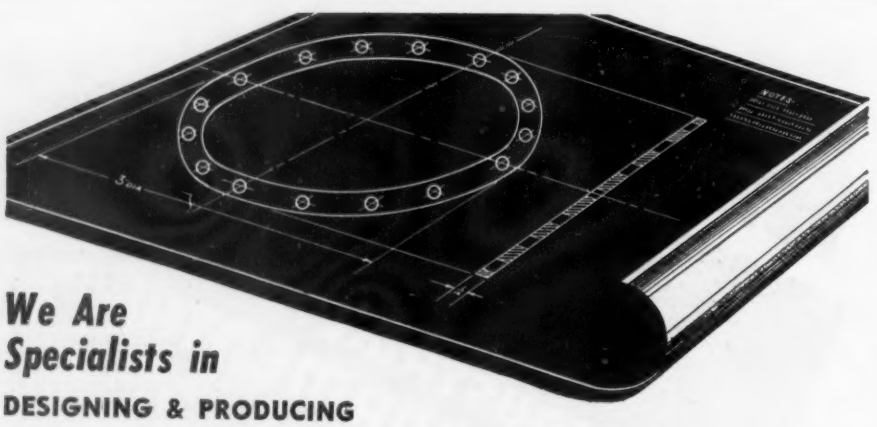
WILLOW RUN, MICH.—Frazer Farm Equipment Corp. has been organized with $500,000 capital to manufacture and sell plows, harrows and cultivators, by William M. Jennings, 120 Broadway, New York.

MINNESOTA

MINNEAPOLIS—Archer-Daniels-Midland Co., 600 Roanoke Bldg., has awarded contract for three-story, 100 x 250-foot plant addition, Malcolm St. and 31st Ave. S. E., to Fegles Construction Co., 711 Wesley Temple Bldg., $250,000.

MISSOURI

KANSAS CITY, MO.—Miller-Stauch Construction Co., Railway Exchange Bldg., general



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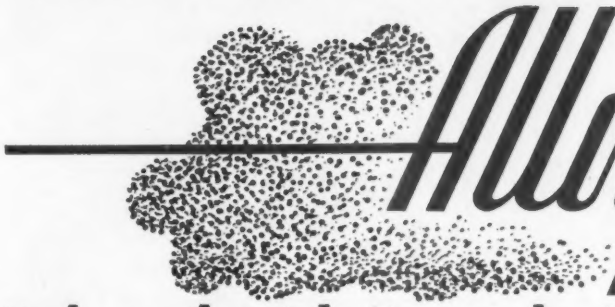

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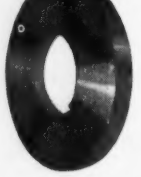

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STRESS RELIEVING
X-RAY TESTING

contractor, has awarded the following subcontracts for fire-damaged plant of Rupert Die Casting Co.; S. H. Sieben, 800 12 Finance Bldg., architect: Roofing, Western Roofing Co.; bar joist, Ceco Steel Corp.; structural steel, Sonken-Galamba Corp.; steel sash, B-D-R Engineering Co., all of Kansas City; steel deck, H. H. Robertson, Ambridge, Pa.

ST. LOUIS—Southern Alloy Foundry Inc., 117 Bowen, has been incorporated to conduct a general foundry and machine shop business, by Louis G. Strotz and associates.

ST. LOUIS—All-Die Co. Inc., 2316 Dickson, has let contract to Alois Bruckmeier, Butler Hill Rd., Box 597, Lemay, Mo., for one-story tool and die shop, 6009 Manchester. R. L. Horst, 6326 Lucille Ave.. architect.

NORTH CAROLINA

CHARLOTTE, N. C.—Troy Whitehead Machine Co., has CPA approval for erection of $45,000 plant on Wilkinson Blvd. for rebuilding and manufacturing textile machinery.

OHIO

CLEVELAND—Boiardi Steel Corp. has been formed by Hector Boiardi, 823 Prospect Ave., who is the owner of part of the assets of the defunct Milton Steel Co., Milton, Pa.

COLUMBIANA, O.—F. C. Russell Co., manufacturer of metal storm sash, has started work on two additions to its local plant; one addition, to provide 100 x 80-foot storage space, the other, a 25 x 45-foot loading dock.

CONNEAUT, O.—General Electric Co. plans construction of a $193,000 warehouse at its local base works.

GALION, O.—Perfection Steel Body Co., S. East St., Ralph Cobey, secretary-treasurer, is contemplating construction of a one-story factory addition.

KENTON, O.—Kenton Foundries Inc., Frederick Bldg., Cleveland, has begun construction of an addition to its Kenton, O., plant, which will increase its molding department's capacity.

MIDDLETOWN, O.—American Rolling Mill Co. has received CPA approval for an expansion of the company's shipping building, estimated to cost $118,700.

NILES, O.—Republic Steel Corp. has construction well under way of a 115 x 200-foot building which will furnish space for additional annealing units. Output of the two electrolytic tinning lines at Niles will be increased as part of this expansion program.

SANDUSKY, O.—Rankin Machinery Co. Inc., has been formed with 250 shares of no par value to manufacture transmission machinery, by Mansel L. Rankin, 1741 Columbus Ave., Wayne L. and Ester M. Rankin.

OREGON

SALEM, OREG.—Blue Lake Products Co-operative plans additions to warehouse at 376 Patterson St., one structure of which is to be used as a machine shop.

TENNESSEE

BRISTOL, TENN.—Monroe Calculating Co. has awarded contract to Alley Construction Co. for construction of factory building, to cost approximately $1 million. Epple & Kahns, Newark, N. J., architects.

CHATTANOOGA, TENN.—Times Printing Co., News Free Press Co., contemplate a $400,000 expansion program; total investment to be $750,000 including new equipment.

ELIZABETHTON, TENN.—Elizabethton Electric System will soon let contract for shop to cost $60,000. Gill & Bianculli, Chattanooga Bank Bldg., Chattanooga, Tenn., architects.

GALLATIN, TENN.—J. C. Harvey and L. A. Green plan construction of plant on recently acquired property for manufacture of metal awnings.

KNOXVILLE, TENN.—Cherry Street Block Co. has CPA approval for addition to building to be used for manufacture of coal mining equipment, to cost $25,000.

MEMPHIS, TENN.—Dixie Tank & Bridge Co., 2144 Lamar, is erecting facilities costing $225,000.

MEMPHIS, TENN.—Lewis Supply Mfg. Co. has CPA approval for reconstruction of building recently acquired from Jones & Laughlin Steel Co.; plant to be used for manufacture of saw mill equipment.

TEXAS

CORPUS CHRISTI, TEX.—Steel Engineering Co., C. V. Thornton, Ft. Worth, Tex., has acquired 5-acre site, Villa Drive and Robstown Rd., to be used as location for steel plant; construction of first unit to begin in January, at cost of $80,000. Eventually the plant will involve approximately $500,000 worth of buildings.

DEER PARK, TEX.—Rohm & Haas Co., Philadelphia, has acquired 500 acres of land on Houston ship channel as site for erection of plant for manufacture of chemical products.

HOUSTON, TEX.—Dye Welding Supply Co., 4515 Fannin, has been incorporated with $80,000, by Gil V. Dye, president.

HOUSTON, TEX.—Independent Oxygen Co., incorporated with $75,000 by Gil V. Dye, president, has new plant at 6201 Industrial Way.

HOUSTON, TEX.—Earl McMillian Co., Earl McMillian, president, plans construction of factory for rebuilding automobile engines and other auto parts at Hempstead Rd. and 11th Ave., to cost approximately $300,000.

WASHINGTON

PORT ANGELES, WASH.—City has awarded contract to General Electric Co., Schenectady, N. Y., to furnish equipment for four substations, to cost $129,946.

SPOKANE, WASH.—Spokane Metals Co. plans construction of several concrete warehouses on a 12-acre tract.

TACOMA, WASH.—St. Regis Paper Kraft Co., Pulp Division, has received CPA approval for a proposed $450,000 plant addition. A large quantity of equipment will be installed.

WISCONSIN

BELOIT, WIS.—Fairbanks Morse & Co., 600 S. Michigan Ave., Chicago, has awarded contract for one-story, 163 x 703-foot diesel locomotive plant to Cunningham Bros.; steel, to Bethlehem Steel Corp., 400 N. Michigan Ave., Chicago, for an estimated $920,000.

WYOMING

CASPER, WYO.—Bureau of Reclamation has awarded the following large contracts for the Kortes power plant project, on the North Platte river about 60 miles southwest of here: Three 18,500 hp turbines and three governors to Allis-Chalmers Mfg. Co., Milwaukee, $354,383; and three 13,333-kva oil-immersed outdoor-type transformers to Pensylvania Transformer Co., Pittsburgh, $127,000.

CANADA

KITCHENER, ONT.—Waterloo Spring Co. Ltd., 102 Breithaupt St., plans construction of plant addition estimated to cost $40,000. Jenkins & Wright, 49 King St. E., architects.

LEASIDE, ONT.—Metals & Alloys Ltd., Wickstead Rd., S. R. Francis, president, will build one-story plant addition, to cost about $50,000. Govan, Ferguson & Lindsay, 515 Jarvis St., Toronto, Ont., architects.

LONDON, ONT.—Wells Foundry Co., 1243 York St., will build plant addition estimated to cost $35,000.

MONTREAL, QUE.—International Harvester Co. of Canada Ltd., Hamilton, Ont., has asked for bids for construction of plant to cost about $350,000. Ross, Patterson, Townsend & Heughan, Dominion Square Bldg., Montreal, architects.

MONTREAL, QUE.—Montreal Locomotive Works Ltd., 215 St. James St. W., has awarded contract to Douglas Bremner Construction Co. Ltd., 2049 McGill College Ave., for construction of plant addition to cost about $50,000. Sidney Comber & Son, 1502 St. Catherine St. W., architects.

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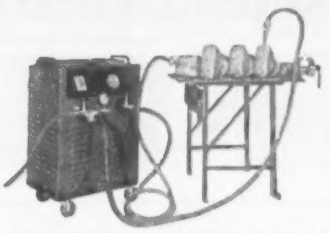

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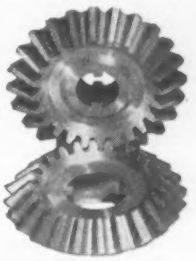

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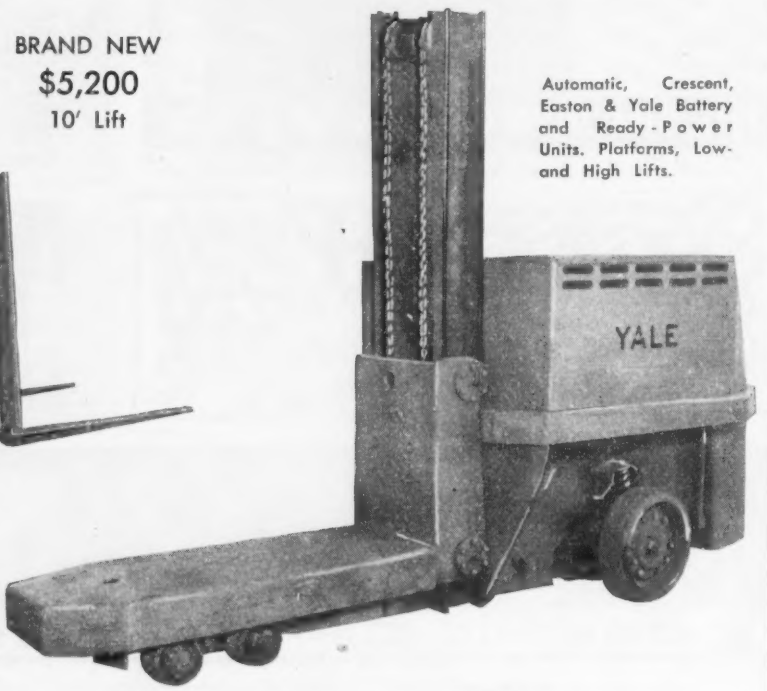

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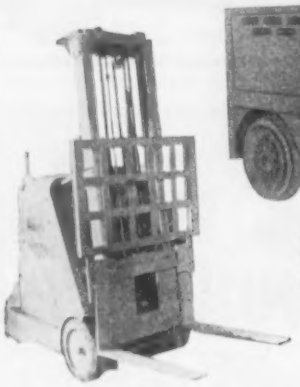

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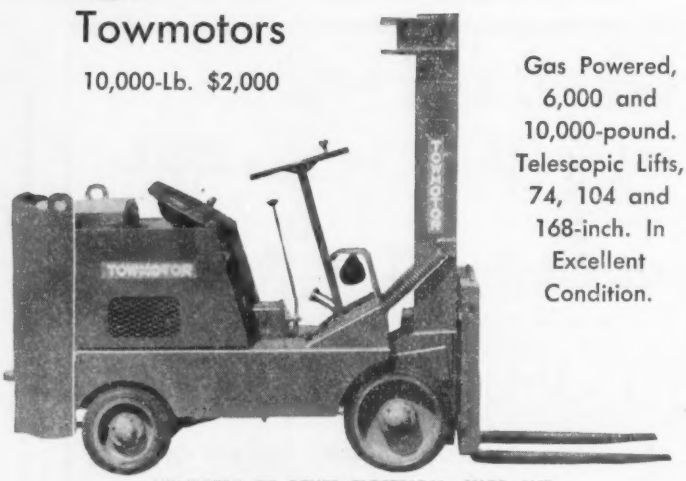

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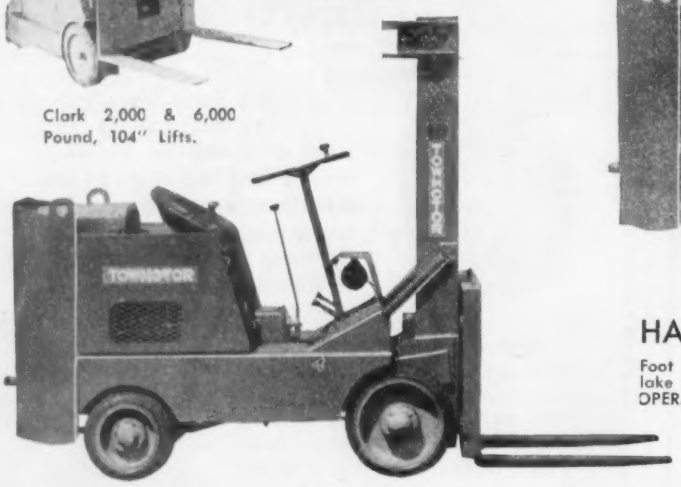

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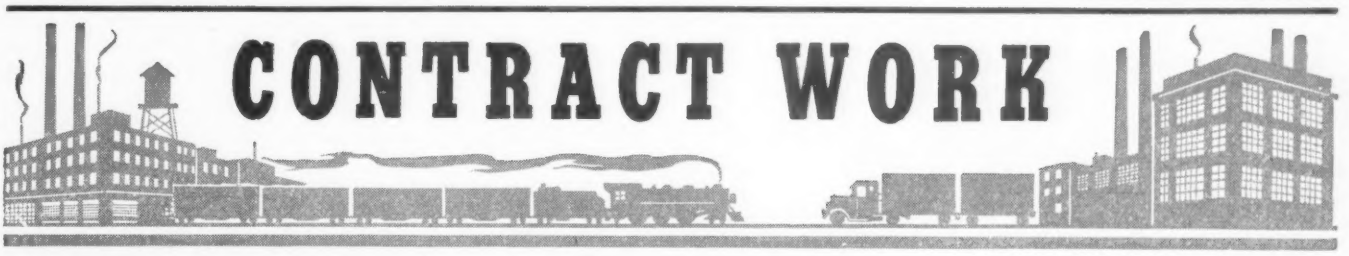

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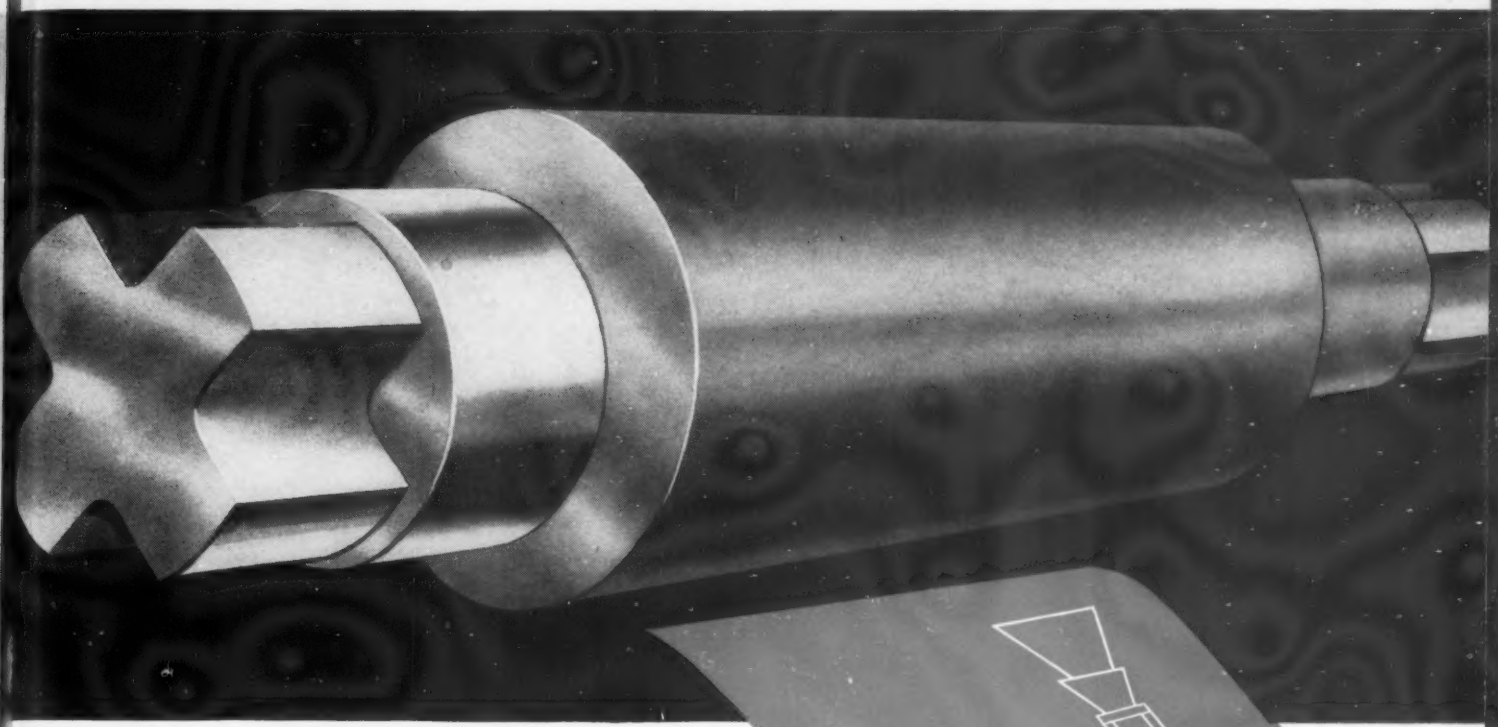
Experience Available in ROLL Form



- There is an Aetna-Standard Size and Type of
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- from rolls for an 8-inch mill, all intermediate sizes, up to large plate mill rolls, 34" x 206".

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MOLY CHILL	GRAIN
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You know your job. We know ours. When you buy Aetna-Standard Rolls you are buying 34 years of experience in designing and casting iron-base rolls.

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THE AETNA-STANDARD ENGINEERING CO.

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY

HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND

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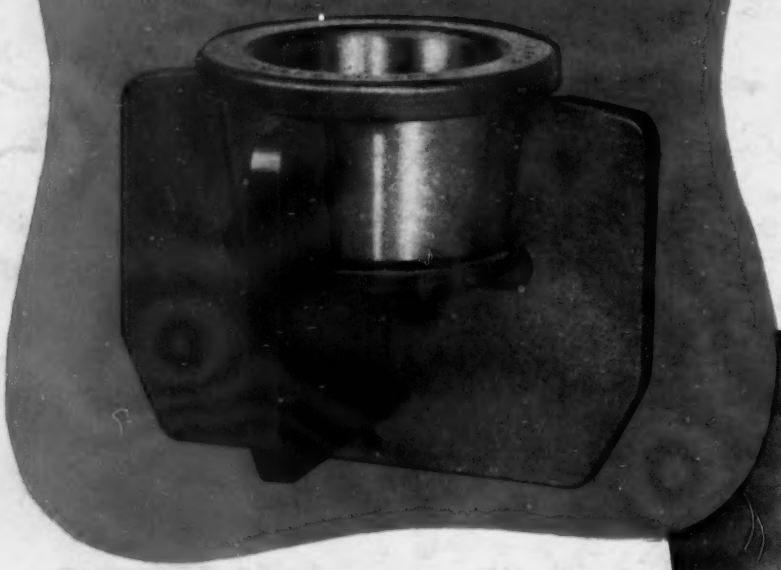
Accurate Long Wearing Gages

ARE MADE FROM

GRAPH-MO STEEL



Few products demand the skill and accuracy that is required in the manufacture of gages. The steel from which they are made must be of equally high calibre.

Recognizing this fact is the reason that so many of the best known gage manufacturers are making gages of Graph-Mo Steel.

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